UNIVERSITÉ DE SHERBROOKE

Les conséquences socio-économiques du handicap dans les pays en développement

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RÉSUMÉ

La présente thèse traite des conséquences socio-économiques de la survenue du handicap (deux premiers articles), ou d'une variation de sa sévérité (troisième article), sur les ménages en général et les enfants en particulier dans le contexte des pays en développement. Elle se compose de trois articles. Le premier article se penche sur l'impact de la survenue du handicap chez les parents sur le travail et le capital humain des enfants. En effet, le handicap peut constituer un frein à la participation au marché du travail et de ce fait priver les parents des ressources nécessaires pour investir dans le capital humain de leur progéniture. Par ailleurs, les enfants de personnes handicapées pourraient être appelés à soutenir financièrement la famille; ceci les expose au travail des enfants qui peut affecter leur santé et représenter un obstacle à leur éducation. Dans la mesure où le capital humain détermine le bien-être à long terme des individus et joue un rôle clé dans le développement socio-économique d'une société, tout facteur susceptible de compromettre l'accumulation dudit capital chez l'enfant mérite une attention particulière. Les données utilisées dans ce premier article proviennent de l'Ethiopie. Les résultats révèlent que l'effet intergénérationnel de la survenue du handicap varie suivant le sexe du parent handicapé. Une comparaison entre filles et garçons indique que la survenue du handicap chez le père est beaucoup plus préjudiciable à l'accumulation du capital humain chez les filles car les ménages jugent plus rentable d'investir dans l'accumulation du capital humain des garçons que celui des filles. Cependant la survenue du handicap chez la mère favorise la participation au marché du travail des garçons. Ceci s'explique par la substituabilité entre la main d'œuvre de l'enfant et celle de la mère et par la division des tâches entre les filles et les garçons qui conduit ces derniers à être plus susceptibles de participer aux activités économiques que leurs sœurs.

Notre deuxième article traite de l'impact de la survenue du handicap sur l'offre de travail des adultes en Ouganda. Les résultats des estimations nous amènent à conclure

que la survenue du handicap réduit le temps consacré par les hommes aux activités économiques. Pour ce qui est de la marge extensive de l'offre de travail, les résultats indiquent que la survenue du handicap ne détermine pas la probabilité de prendre part aux activités économiques.

Alors que les deux articles précédents s'intéressent au rôle de la survenue du handicap sur l'allocation du temps des membres du ménage, le dernier article se focalise sur l'effet de la variation de la sévérité du handicap sur l'allocation des ressources du ménage. Nous nous appuyons sur des données indonésiennes qui couvrent 17 ans pour conduire notre analyse. Les résultats de nos estimations révèlent qu'une augmentation de la sévérité du handicap pénalise le ménage dans la mesure où elle le contraint à réduire sa consommation (non médicale). Les dépenses d'éducation constituent le poste le plus affecté par ce choc sur la santé; ceci indique qu'au sein des ménages, un accroissement de la sévérité du handicap chez les adultes compromet l'accumulation du capital humain chez les plus jeunes générations.

Mots clés : allocation des ressources, capital humain, handicap, travail

TABLE DES MATIÈRES

LISTE DES TABLEAUX

LISTE DES FIGURES

LISTE DES ABRÉVIATIONS ET ACRONYMES

ADL	*Activities of Daily Life*
AVQ	Activités de la vie quotidienne
DD-PSM	*Difference-in-Difference Propensity Score Matching*
ESS	*Ethiopia Socio-economic Survey*
HH	Household (s)
IFLS	*Indonesian Family Life Survey*
ILO	*International Labour Organisation*
LMICs	*Low and Middle Income Countries*
MFI	*Microfinance Institution*
MOLSA	*Ministry of Labour and Social Affairs of the Federal Democratic Republic of Ethiopia*
PSM	*Propensity Score Matching*
PWDs	*People with disabilities*
UN	*United Nations*
UNFPA	*United Nations Population Fund*
UNICEF	*United Nations International Children's Emergency Fund*
USDL	*United States Department of Labor*
WB	*World Bank*
WGD	*Washington Group on Disability*
WHO	*World Health Organization*

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AVANT-PROPOS

Le choix du sujet, l'analyse des données et la rédaction des articles qui constituent les deux premiers chapitres de cette thèse ont été faits par moi. Quant au troisième chapitre, il a été co-écrit avec Sophie Mitra, Professeure à la Fordham University (New-York) dont la recherche est axée sur le handicap dans les pays en développement. C'est elle qui a proposé le thème de recherche; toutefois, c'est moi qui ai effectué l'analyse des données et rédigé l'article. L'élaboration de ce troisième article a été amorcée pendant ma résidence en institution obligatoire, dans le cadre du Doctorat en Economie du Développement.

Les deux premiers articles ont été présentés aux conférences organisées par l'Association Canadienne d'Economique et la Société Canadienne des Sciences Economiques. Le premier article a également été présenté à la conférence du *Centre for the Study of African Economies* (Université d'Oxford) et à la *CIREQ's PhD Students' Conference* tandis que le deuxième article a été présenté aux Journées de Microéconomie Appliqué (France). Le troisième article a été présenté aux séminaires de la *Fordham University* et sera présenté à la *Annual Meeting of the American Economic Association* 2019.

INTRODUCTION

Si certains problèmes de santé ont des conséquences négligeables sur la vie des individus, tel n'est pas toujours le cas du handicap. En effet, la survenue d'un handicap est susceptible de bouleverser le cours de l'existence de l'ensemble des membres d'un ménage en raison de ses répercussions néfastes qui peuvent s'étendre sur une très longue période (Anderson, Huth, Garcia et Swezey, 2014). Selon la classification internationale du fonctionnement du handicap et de la santé (WHO, 2001), le handicap correspond aux limitations fonctionnelles dont l'individu peut être victime. Il est important de mentionner ici que cette définition du handicap adoptée par l'Organisation Mondiale de la Santé ne fait pas de distinction entre un handicap "permanent" et un handicap "temporaire".

Les personnes handicapées constituent la plus grande minorité au monde (Bristo, Blauwet, Frontera, Tolchin, Stein, Hoppe et Kirschner, 2014; Laddha, 2016); elles représentent 15% de la population mondiale et 80% d'entre elles vivent dans des pays en développement (WHO, 2011). Malgré le fait qu'elles forment l'un des groupes les plus marginalisés et vulnérables de la société (Mulligan et Gooding, 2009), les personnes handicapées ont longtemps été ignorées dans l'agenda du développement. Leur inclusion dans les objectifs de développement durable (2015-2030) concrétise ainsi l'engagement des Nations Unies à inverser cette tendance.

Plusieurs facteurs peuvent être responsables du handicap dans les pays en développement. Il s'agit notamment des catastrophes naturelles, des conflits armés, de la malnutrition, du manque d'accès aux soins de santé et de l'ignorance concernant le handicap (causes, prévention, traitement). Il convient de noter que, tandis que l'attitude vis-à-vis du handicap a évolué dans les pays occidentaux au fil du temps, les croyances superstitieuses concernant le handicap restent profondément enracinées dans les pays du Sud. En fait, dans cette partie du monde, une multitude d'individus continue de croire que le handicap résulte d'une malédiction, d'une punition divine ou

de la sorcellerie. Par ailleurs, les personnes handicapées peuvent aussi être considérées comme des sorciers (Tekalign, 2007).
De telles croyances incitent les familles à cacher leurs membres qui souffrent d'un handicap; et dans certains cas extrêmes, ces derniers sont tout simplement tués (Etieyibo et Omiegbe, 2016). La honte associée au handicap expliquerait ainsi la tendance des individus à sous-déclarer la prévalence du handicap au sein de leur ménage lors des enquêtes (Maart, 2015).

L'exploration des bases de données réalisées dans les pays en développement révèle qu'elles contiennent très rarement des informations sur le handicap. De plus, la section dédiée au handicap a tendance, au fil du temps, à être supprimée des rares enquêtes qui l'intégraient habituellement dans leur questionnaire (ex.: Uganda National Panel Survey).

Compte tenu de ce qui précède, les études qui traitent du handicap dans les pays en développement sont assez rares (WHO, 2011). Or, la démystification du handicap ainsi que l'amélioration des conditions de vie des personnes handicapées et de leurs familles demeureront des objectifs difficilement réalisables si la littérature afférente n'est pas approfondie et étoffée. En effet, la multiplication des travaux de recherche est essentielle pour une prise de conscience à l'égard des personnes handicapées, ainsi que pour l'élaboration et la mise en œuvre des politiques visant l'amélioration des conditions de vie des personnes handicapées (WHO, 2011; Zimmermann, 2014).

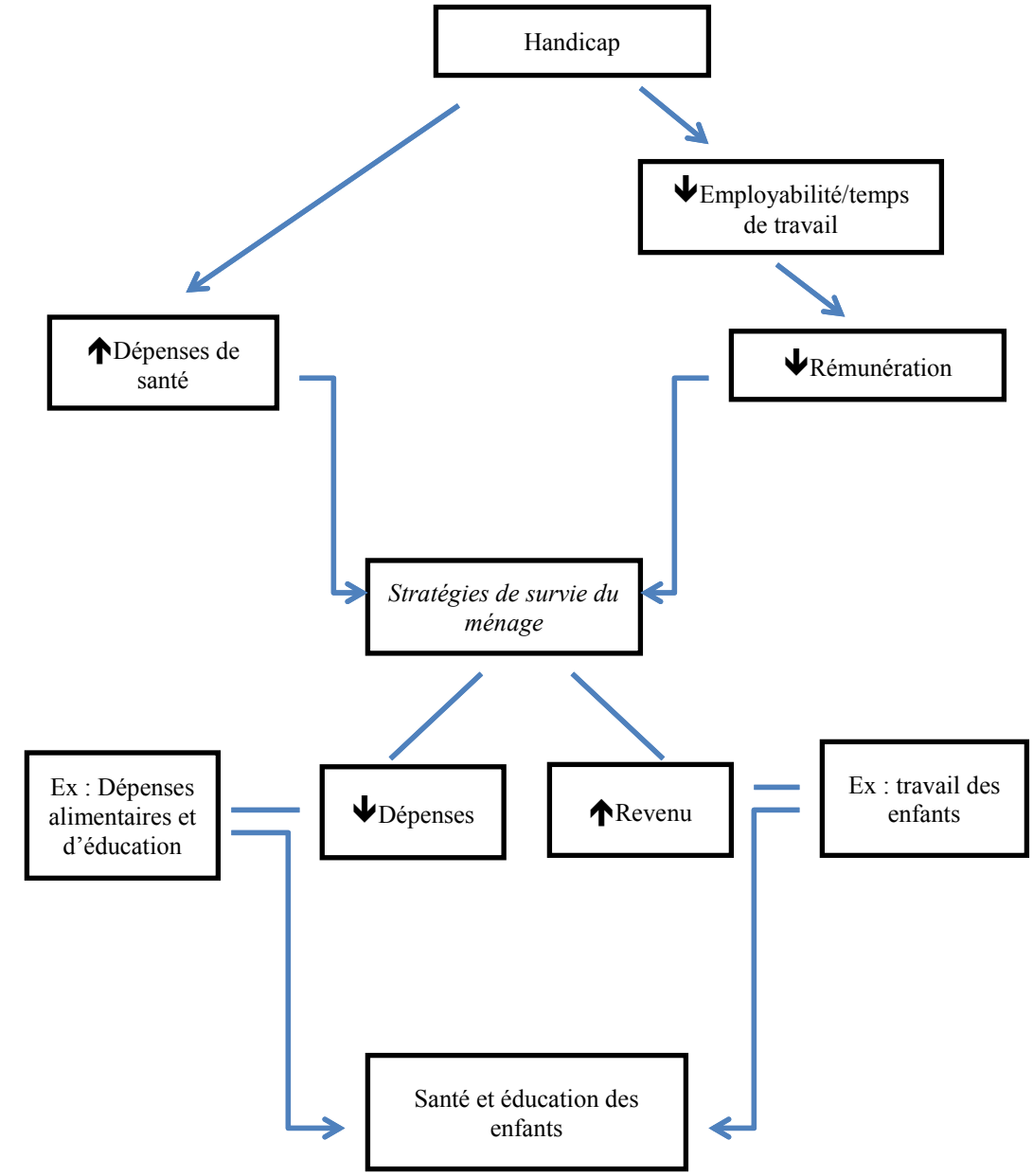
Le handicap peut avoir des effets pernicieux non seulement sur la vie de la personne handicapée, mais également sur l'existence des autres membres du ménage en général, et des enfants en particulier. En plus des coûts médicaux auxquels il peut être associé, le handicap peut empêcher sa victime directe (ainsi que les aidants familiaux) de participer au marché du travail ou encore l'obliger à réduire son offre de main-d'œuvre. Par conséquent, le ménage peut observer une diminution de son revenu de travail en raison du handicap d'un de ses membres (Adioetomo, Mont et Irwanto,

2014; Mitra, Palmer, Mont et Groce, 2016). Cette perte de revenu peut d'une part contraindre le ménage à restructurer l'emploi du temps de ses membres et, d'autre part, à redéfinir son budget.

En raison de cette réallocation du temps faite au sein du ménage, les enfants peuvent être amenés à sacrifier d'autres activités, telles que l'éducation, pour s'engager dans la vie active. Comme le soulignent Haile et Haile (2012), pour pouvoir joindre les deux bouts, les familles pauvres sont parfois contraintes de pousser leurs enfants à rejoindre le marché du travail. Or, le travail peut nuire à la santé de l'enfant et compromettre son éducation (ILO, 2015).

Pour ce qui est de la redéfinition du budget, il s'agit de stratégies concernant les dépenses et les revenus que le ménage peut adopter pour atténuer les répercussions négatives du handicap. Il s'agit notamment de la diminution de sa consommation, de la vente de ses biens, de l'augmentation de son offre de travail, de l'emprunt et du recours aux transferts reçus des proches ou des organisations gouvernementales et non gouvernementales (Yilma, Mebratie, Sparrow, Abebaw, Dekker, Alemu et Bedi, 2014). La figure 1 résume les conséquences socio-économiques du handicap qui nous intéressent dans le cadre de cette thèse.

Figure 1
Conséquences socio-économiques du handicap



Source : auteure

Un examen de la littérature révèle que les travaux sur les conséquences socio-économiques du handicap dans les pays en développement sont assez rares. En outre, les études existantes ont tendance à ignorer l'éventuelle endogénéité qui peut exister dans ce type d'analyse (par exemple, Mizunoya et Mitra, 2013; Raccanelo et Garduno, 2012). De ce fait, les recommandations de politique économique qui en découlent sont peu fiables dans la mesure où les résultats reflètent une corrélation et non une relation causale entre les variables d'intérêt : ceci renforce l'idée que la littérature afférente devrait être étoffée.

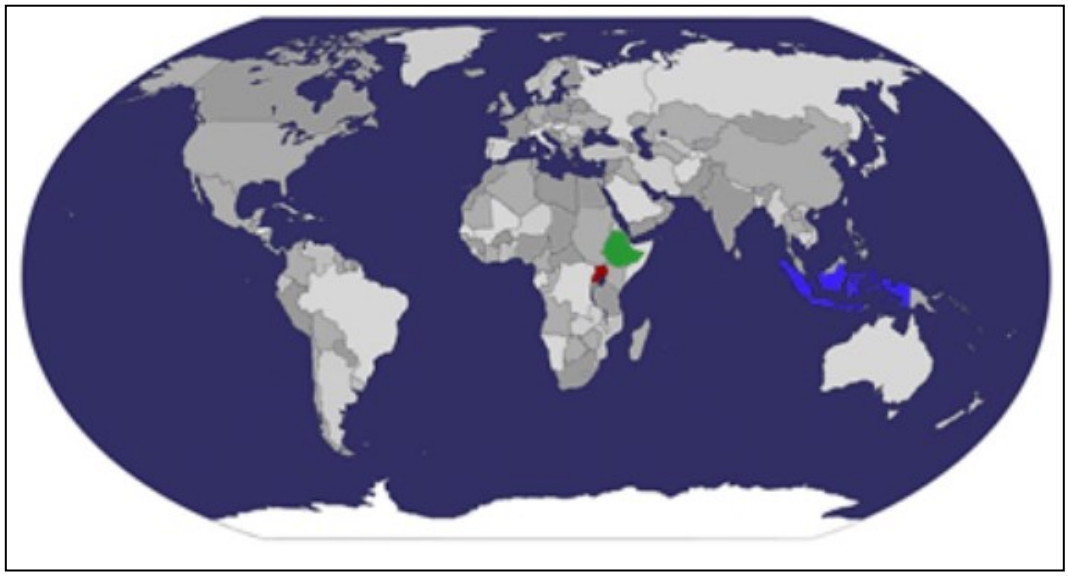
Notre thèse se compose de trois articles et son objectif général est d'analyser certaines conséquences socio-économiques du handicap. Nous nous focalisons sur les pays en développement dans la mesure où cette partie du monde est la plus touchée par le handicap. Notre travail se construit autour de trois hypothèses. Alors que les deux premières hypothèses traitent de l'allocation du temps des membres du ménage, la troisième s'intéresse à l'effet du handicap sur la définition du budget du ménage.

Notre première hypothèse est que la survenue du handicap des parents est susceptible de provoquer le travail des enfants et entrave l'accumulation du capital humain chez ces derniers. Nous testons cette hypothèse en analysant l'effet de la survenue du handicap du père et de la mère sur le travail, la santé et l'éducation des enfants en Éthiopie. La deuxième hypothèse est que la survenue du handicap chez l'adulte réduit son offre de main-d'œuvre. Cette hypothèse est vérifiée en analysant l'effet de la survenue du handicap sur les marges extensive (probabilité de travailler) et intensive (temps de travail) de l'offre de travail en Ouganda. La troisième hypothèse concerne les stratégies d'adaptation des ménages mentionnées plus haut. En d'autres termes, nous supposons que l'augmentation des dépenses de santé combinée à la baisse des revenus que connaissent les ménages suite à une augmentation de la sévérité du handicap, les empêche de maintenir leur consommation. Par ailleurs, ils sont contraints de vendre leurs biens d'une part et compter sur les transferts venant de tiers pour pouvoir joindre les deux bouts. Afin de vérifier cette hypothèse, nous évaluons

l'effet d'une variation de la sévérité du handicap au sein des ménages indonésiens sur les dépenses de santé, les dépenses non médicales en général et les dépenses d'éducation en particulier, le revenu du travail, les actifs du ménage et les transferts reçus.

Bien qu'ils ne soient pas représentatifs d'autres pays en développement, ces trois pays (voir la figure 2 pour leur localisation géographique) ont été choisis en raison de leur forte prévalence de handicap et parce qu'ils possèdent des bases de données appropriées pour notre analyse.

Figure 2
Carte du monde



Légende: Ethiopie (vert), Ouganda (rouge), Indonésie (bleu)
Source : https://www.worldmapmaker.com

Compte tenu du fait que le handicap peut déclencher un effet boule de neige, il est important, du point de vue des politiques économiques, d'appréhender la vulnérabilité des ménages vivant avec une personne handicapée. En analysant les conséquences socio-économiques de la survenue du handicap ou d'une variation de sa sévérité, notre thèse vise à informer les pouvoirs publics sur les mesures à adopter pour d'une

part favoriser le bien-être des handicapés, et d'autre part améliorer les conditions de vie des membres de leurs ménages en général et des enfants en particulier.

La contribution de cette thèse, dont l'objectif principal est d'analyser les conséquences socio-économiques de la survenue du handicap ou d'une variation de sa sévérité, peut être considérée sous différents angles. En analysant l'impact de la survenue du handicap chez les parents sur la santé, l'éducation et le travail des enfants, notre premier article vise à étoffer la littérature sur les effets intergénérationnels du handicap qui est peu abondante à l'heure actuelle. En fait, à notre connaissance, cet article est le premier à s'intéresser à l'effet de la survenue du handicap des parents sur une composante importante du capital humain de l'enfant et pourtant ignoré par les études antérieures: la santé. Par ailleurs, les travaux existants se servent de la probabilité d'inscription à l'école comme mesure de l'éducation des enfants. Un tel indicateur de l'éducation des enfants peut être trompeur car être inscrit à l'école ne signifie pas forcément assister aux cours. Or, l'absentéisme joue un rôle majeur dans l'échec scolaire (UNICEF, 2010). C'est pourquoi, dans le premier article, en plus de l'inscription scolaire, nous considérons également l'absentéisme comme indicateur de l'éducation.

En ce qui concerne le deuxième article, la littérature qui traite de l'effet du handicap sur la participation au marché du travail tend à se focaliser sur la marge extensive de l'offre de travail. La marge intensive de l'offre de main-d'œuvre est ainsi négligée alors qu'elle détermine les revenus et par conséquent le bien-être de l'individu. Par ailleurs, à notre connaissance, il n'existe qu'une seule étude publiée concernant l'effet du handicap sur l'offre de travail qui tienne compte de l'endogénéité en s'appuyant sur des données d'un pays en développement. Notre deuxième article contribue donc à la littérature existante en s'intéressant à la marge intensive de l'offre de main-d'œuvre d'une part, et en utilisant une méthodologie (modèle à effet fixe) qui n'ignore pas les problèmes potentiels d'endogénéité d'autre part.

Pour ce qui est du troisième article, les rares études existantes qui portent sur les mécanismes d'adaptation des ménages vivant avec un handicapé dans les pays en développement, se limitent au court ou au moyen terme. Les effets observés à long terme demeurent donc un mystère à élucider. Notre étude vise à combler cette lacune observée dans la littérature.

Le reste de la thèse est organisé comme suit : dans un premier temps, nous présenterons une brève revue de la littérature[1] ainsi que la méthodologie utilisée pour mener notre analyse. Ensuite, nous développerons les trois articles qui composent notre thèse; ils seront suivis d'une discussion générale et de la conclusion de la thèse.

REVUE DE LA LITTÉRATURE

Dans cette section, nous présentons successivement la revue de la littérature associée respectivement aux première, deuxième et troisième hypothèses qui guident notre thèse. On a peu d'informations concernant les répercussions du handicap sur le travail des enfants, leur santé ou leur éducation. Ceci s'explique certainement par le fait que la littérature sur l'effet intergénérationnel du handicap se focalise généralement sur la situation des mères ayant des enfants handicapés (Stabile et Allin, 2012). À notre connaissance, seuls trois articles (Raccanello et Garduno, 2012; Mont et Nguyen, 2013; Alam, 2015) s'intéressent à l'effet du handicap des parents sur au moins une des variables qui font l'objet de notre premier chapitre (travail des enfants, éducation, santé).

Le premier est celui de Raccanello et Garduno (2012); les auteurs utilisent des données mexicaines et constatent que les enfants de parents handicapés sont plus enclins que leurs pairs à abandonner l'école pour devenir oisifs. Leurs résultats les amènent à conclure que le travail des enfants n'est pas le canal à travers lequel le

[1] Voir les articles pour une revue de la littérature plus complète.

handicap des parents compromet l'éducation des enfants (puisque c'est l'oisiveté et non le travail qui prédomine chez ces enfants).

En ce qui concerne le deuxième article, il est de Mont et Nguyen (2013) qui, contrairement aux auteurs précédents, ne traitent pas du travail des enfants. Leurs résultats, basés sur des données vietnamiennes, révèlent que le handicap des parents diminue la probabilité, pour un enfant, d'être inscrit à l'école et de terminer ses études. Par ailleurs, l'effet est plus prononcé lorsque c'est la mère qui est handicapée. Pour sa part, Alam (2015) utilise les données tanzaniennes et son étude montre que seul le handicap du père a un effet sur la probabilité pour l'enfant d'être inscrit à l'école, ce qui s'explique par la baisse du revenu que connait le ménage suite au handicap du père qui en est le chef. C'est pourquoi, les trois articles s'accordent sur le fait que le handicap des parents a des effets négatifs sur la vie de leurs enfants. Dans cette thèse, nous ne nous limitons pas aux effets intergénérationnels du handicap; nous explorons également l'effet du handicap sur le comportement d'offre de travail de ses victimes directes.

Un passage en revue de la littérature révèle que les articles portant sur l'impact du handicap des adultes sur leur offre de travail (notre deuxième chapitre), concluent généralement que la première variable a un effet négatif sur la seconde. Il convient cependant de noter que les travaux existants ont tendance à se focaliser sur les pays développés (Campolieti, 2002, Jones, 2008, Jones et Latreille, 2011, Polidano et Vu, 2015). À notre connaissance, il n'y a qu'un seul article publié, parmi les rares études qui s'intéressent aux pays en développement, qui n'ignore pas les problèmes d'endogénéité. C'est l'article de Schultz et Tansel (1997), qui montre que le handicap réduit le temps dédié aux activités économiques. Les auteurs se servent des données ghanéennes et ivoiriennes et ont recours aux doubles moindres carrés (les prix des denrées alimentaires sont utilisés comme variables instrumentales).

Bridges, Gaggero et Owens (2015) utilisent les données collectées à Kampala, capitale de l'Ouganda, et constatent que le handicap réduit la probabilité de travailler mais n'a aucun impact sur le temps consacré aux activités économiques. Contrairement à l'étude de Bridges *et al*. (2015), notre deuxième article a une portée plus large puisque nous considérons les handicapés ougandais à l'échelle nationale. L'étude de Mizunoya et Mitra (2013) est basée sur 15 pays en développement[2]. Les auteurs constatent que, dans la majorité de ces pays, les personnes handicapées présentent un taux d'emploi inférieur à celui de leurs pairs non handicapés. Ils remarquent également que l'écart entre les taux d'emploi est plus élevé chez les femmes que chez les hommes. Le lien négatif entre le handicap et l'offre de travail est également confirmé par les travaux de Trani et Loeb (2012) en Zambie ou de Mitra et Sambamoorthi (2008) en Inde.

En résumé, les rares études existantes concernant les pays en développement concluent que le handicap entrave la participation au marché du travail. Cependant, comme l'ont souligné Mizunoya et Mitra (2013), les limites que présentent les bases de données contraignent les chercheurs à ignorer les éventuels problèmes d'endogénéité dans leur analyse. Le handicap peut ainsi constituer un obstacle à l'épanouissement professionnel de l'individu qui en est victime; il peut aussi nuire au bien-être du ménage dans son ensemble.

Étant donné que la survenue du handicap ou un accroissement de sa sévérité au sein du ménage peut être associée à une augmentation des dépenses de santé couplée à une baisse du revenu, il convient de comprendre comment les ménages affectés gèrent leur budget pour faire face aux difficultés financières auxquelles ils sont exposés. Une exploration de la littérature sur les stratégies d'adaptation des ménages affectés par le handicap, révèle que le débat tourne autour de la capacité du ménage à maintenir sa consommation. Des études basées sur des données américaines (Stephens, 2001,

[2] Afrique : Burkina-Faso, Ghana, Kenya, Malawi, Ile Maurice, Zambie, Zimbabwe ; Asie : Bangladesh, Laos, Pakistan, Philippines ; Amérique : Brésil, République Dominicaine, Mexique, Paraguay.

Meyer et Mok, 2013) révèlent que les ménages touchés peuvent maintenir leur consommation à court terme en raison de la faible baisse du revenu du ménage. Cependant, l'hypothèse du maintien de la consommation est invalidée à long terme, reflétant ainsi la vulnérabilité desdits ménages.

Les études basées sur les pays en développement sont rares et ne s'appuient pas sur des données qui couvrent le long terme. Les trois articles (Gertler et Gruber, 2002; Gertler, Levine et Moretti, 2009; Genoni, 2012) qui portent sur les données indonésiennes sont présentés ci-dessous. La première étude est de Gertler et Gruber (2002) qui observent une diminution des revenus des ménages suite à la survenue du handicap. Par ailleurs, ces ménages ne sont pas capables de maintenir leur consommation et les effets négatifs observés augmentent avec la sévérité du handicap. Il convient de noter que l'hypothèse du maintien de la consommation est également invalidée par l'étude de Heltberg et Lund (2009) qui s'appuie sur des données pakistanaises.

Contrairement à l'étude de Gertler et Gruber (2002), les deux autres études qui portent sur l'Indonésie (Gertler *et al*., 2009; Genoni, 2012) constatent que les ménages peuvent maintenir leur consommation malgré le handicap d'un de leurs membres. En effet, selon Gertler *et al*. (2009), l'accès aux institutions de microfinance, en raison des opportunités de prêts et d'épargne qu'elles offrent, peut aider les ménages affectés à maintenir leur consommation. Le rôle joué par les établissements de microfinance est également présenté dans l'étude d'Islam et Maitra (2012). Ces auteurs s'intéressent au Bangladesh et concluent que l'accès au microcrédit joue un rôle important dans le maintien de la consommation en empêchant les ménages d'être contraints de vendre leur bétail. La dernière étude relative à l'Indonésie provient de Genoni (2012) qui a constaté que les transferts provenant des membres de la famille (non co-résidents), aident les ménages à maintenir leur consommation.

Contrairement aux auteurs mentionnés ci-dessus, Bales (2013) ou encore Mitra *et al*. (2016) se servent de données vietnamiennes. Ils s'accordent sur le fait que les ménages vietnamiens maintiennent leur consommation malgré une augmentation des dépenses de santé. Si dans le premier article, ce sont les transferts reçus qui permettent aux ménages de maintenir leur consommation, dans le second, les stratégies adoptées sont: la vente des biens du ménage, l'emprunt et la diminution des dépenses d'éducation. En résumé, les travaux existants qui s'appuient sur des données collectées dans des pays en développement se limitent à une analyse de court terme, laissant ainsi le soin aux recherches futures d'explorer les mécanismes d'adaptation de long terme.

Notre revue de la littérature révèle que le handicap a des effets négatifs sur le ménage dans son ensemble. Dans le contexte des pays en développement, la rareté des études sur les conséquences socio-économiques du handicap, d'une part, et les lacunes observées dans les rares articles existants d'autre part, s'expliquent principalement par les limites des bases de données disponibles. La méthodologie utilisée pour analyser nos données est présentée ci-dessous.

MÉTHODOLOGIE

Le problème auquel est confronté le chercheur qui analyse les conséquences socio-économiques du handicap est l'endogénéité qui provient de trois sources: les erreurs de mesure, la causalité inverse (ex: le handicap peut affecter le travail et le travail peut causer le handicap) ou le problème de variable omise (ex: un individu peut simuler un handicap afin de bénéficier des transferts venant des proches ou de l'Etat, sa «vraie motivation» est une variable omise). Les expériences randomisées, les expériences naturelles et la méthode des variables instrumentales sont des outils que le chercheur peut utiliser face au problème d'endogénéité.

Les expériences randomisées sont coûteuses et peuvent être difficiles à réaliser pour des raisons d'ordre éthique (par exemple on ne devrait pas provoquer un handicap chez un individu juste pour les besoins d'une étude). Pour ce qui est des deux autres approches, les limites des bases de données constituent un obstacle à leur mise en œuvre (Levinsohn, McLaren, Shisana et Zuma, 2013). En fait, les événements qui peuvent servir d' « expérience naturelle » sont rares, d'une part, et il est difficile de trouver des variables instrumentales valides d'autre part (c'est-à-dire une variable qui influence la variable dépendante uniquement par le canal de la variable endogène). Lorsque les données de panel sont disponibles, une alternative est de recourir au modèle à effets fixes qui permet de contrôler les effets fixes individuels (caractéristiques individuelles non observables qui ne varient pas au cours du temps telles que les dotations génétiques) ainsi que les effets temporels (facteurs non observables par le chercheur, qui influencent toute une population à un moment donné, telles que les catastrophes naturelles ou la législation). Cependant, le modèle à effets fixes présente des inconvénients. Premièrement, il ne contrôle pas l'hétérogénéité liée aux facteurs non observables qui varient selon l'individu et à travers le temps (ex: goûts et préférences). Deuxièmement, il ne permet pas d'estimer l'effet des variables qui ne varient pas au cours du temps. Par exemple, soit D une variable binaire qui indique si l'individu est handicapé ou non et Y l'offre de travail. L'identification de l'effet de D sur Y n'est possible que si des individus changent de statut (ex: de non handicapé à handicapé) entre les vagues de l'enquête longitudinale. Dans notre thèse, nous appliquerons les moindres carrés ordinaires sur un modèle à effets fixes.

La spécification 1 ci-dessous sert à estimer l'effet du handicap des parents sur les enfants (chapitre 1):

$$Y_{it} = \beta_0 + \beta_1 D_{Fit} + \beta_2 D_{Mit} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad \text{(Spécification 1)}$$

Dans la spécification présentée ci-dessus, Y_{it} est la variable dépendante (travail des enfants, éducation ou santé des enfants) et représente la situation d'un enfant donné *i*

au temps t[3]. β_0 est la constante, β_1 et β_2 sont les coefficients associés au handicap du père et de la mère respectivement. γ est le vecteur des coefficients associés aux variables de contrôle. $D_F=1$ si le père est handicapé et 0 sinon. De la même manière, $D_M=1$ si la mère est handicapée et 0 sinon. X représente un ensemble de variables de contrôle: la taille du ménage, le groupe d'âge de l'enfant et une variable muette pour les chocs naturels. Cette dernière variable indique si, au cours des 12 mois précédant l'enquête, le ménage dans lequel vit l'enfant a été affecté par une catastrophe naturelle susceptible d'affecter la production agricole (sécheresse, inondation, glissements de terrain/avalanche, fortes pluies empêchant le travail, autres destruction des récoltes) . μ_i représente les effets fixes individuels (associés à l'enfant) tandis que λ_t correspond aux effets fixes temporels. ε_{it} est le terme d'erreur idiosyncratique, c'est-à-dire les caractéristiques non observables qui changent au cours du temps et selon l'individu et influencent Y_{it}.

Nous avons également recours aux doubles moindres carrés comme méthodologie alternative. Les instruments utilisés ici sont inspirés de l'article de Mont et Nguyen (2013); il s'agit de la prévalence du handicap dans le district d'une part et de l'âge des parents d'autre part. Il est cependant important de noter que la validité de ces instruments peut être remise en question. Par exemple, le handicap n'est pas le seul canal à travers lequel l'âge du parent influence le capital humain de l'enfant. Il serait possible que les parents les plus âgés aient une forte préférence pour le présent et ne jugent pas nécessaire d'investir dans le capital humain des enfants. Si tel était le cas, l'âge ne serait plus un instrument valide.

[3] Il est possible que la variable dépendante souffre également d'erreurs de mesure; par exemple, il peut y avoir une tendance à sous-déclarer les heures travaillées par les enfants. Comme l'indiquent Davidson et Mackinnon (2004), l'erreur de mesure de la variable dépendante ne pose pas un grand problème. En fait, lorsque la variable dépendante est mesurée avec erreur, ceci entraine une augmentation de la variance des termes d'erreur; ce qui n'est pas un problème grave. Par contre, l'erreur de mesure d'une variable explicative entraîne à la fois une augmentation de la variance du terme d'erreur et la corrélation entre la variable indépendante et le terme d'erreur.

Pour analyser la relation entre le handicap des adultes et leur participation au marché du travail en Ouganda (chapitre 2), nous nous servons de la régression suivante:

$Y_{it} = \alpha + \beta D_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$ (Specification 2)

Dans la spécification présentée ci-dessus, *i* représente un adulte donné de notre échantillon, tandis que *t* correspond à la vague du panel qui est considérée. *Y* représente l'offre de main d'œuvre. Plus précisément, il s'agit de la probabilité de travailler pendant les sept jours précédant l'enquête quand on s'intéresse à la marge extensive de l'offre de travail, et du nombre d'heures travaillées durant cet horizon temporel quand on s'intéresse plutôt à la marge intensive de l'offre de travail. *D* est une variable binaire qui prend la valeur 1 si l'individu est handicapé et 0 sinon. α représente la constante, β est le coefficient associé à la variable explicative tandis que γ représente le vecteur de coefficients associés aux variables de contrôle. Les variables de contrôle sont le statut matrimonial, le statut au sein du ménage et la taille du ménage. μ_i et λ_t sont respectivement les effets fixes individuels et les effets fixes temporels. ε_{it} est le terme d'erreur idiosyncratique.

Nous avons dans ce deuxième article utilisé deux méthodologies alternatives; ce sont les doubles moindres carrés et les doubles différences avec appariement. Les instruments utilisés dans la première méthode sont l'âge de l'individu et la prévalence du handicap dans le district (Mont et Nguyen, 2013). Pour ce qui est de la deuxième méthode, elle consiste à combiner la méthode d'appariement par score de propension à celle des doubles différences.

L'idée derrière la méthode d'appariement par score de propension est de « reproduire » une expérience randomisée en s'appuyant sur des données secondaires (Khandker, Koolwal et Samad, 2010). Elle se base sur la similarité des caractéristiques observables pour apparier les personnes handicapées avec leurs pairs. Par ailleurs, elle ne fait pas d'hypothèse sur la forme fonctionnelle et permet donc

d'éviter le biais de spécification. L'un des problèmes auxquels sont confrontés les chercheurs qui utilisent la méthode d'appariement est celui de la diminution du nombre d'observations après l'appariement qui les contraint très souvent à se contenter d'un échantillon de petite taille[4]. En effet les individus qui n'ont pas pu être appariés sont écartés de l'analyse.

La méthode d'appariement s'appuie sur une hypothèse assez forte (la probabilité d'être handicapé dépend uniquement des caractéristiques observables) que l'on peut relâcher en lui associant une approche en doubles différences. L'avantage des doubles différences avec appariement est qu'elles permettent de contrôler l'hétérogénéité liée aux effets fixes individuels et aux effets temporels.

La spécification 2 est également utilisée dans notre troisième article, cependant ici, *i* représente un ménage donné (chapitre 3). *Y* représente la valeur mensuelle des éléments suivants: revenu du travail, transferts reçus des proches, biens du ménage, dépenses de santé, dépenses non-médicales. Cette dernière variable inclut les dépenses alimentaires, les dépenses d'éducation et toute autre dépense non-alimentaire. *D* est l'indicateur de la sévérité du handicap au sein du ménage; en d'autres termes *D* est l'indice des Activités de la Vie Quotidienne (AVQ) au sein du ménage. *X* est un ensemble de variables de contrôle: taille du ménage, proportion des individus de moins de 15 ans dans le ménage, proportion des adultes de sexe masculin au sein du ménage (plus de 14 ans) et les caractéristiques du chef de ménage (âge, statut matrimonial, niveau d'éducation). Nous avons également eu recours à un modèle à variable retardée comme méthodologie alternative face au problème d'endogénéité.

Compte tenu du fait que les méthodologies sur lesquelles s'appuient nos analyses ne sont pas susceptibles d'éliminer complètement le problème d'endogénéité, dans

[4] La méthode d'appariement n'a pas été utilisée dans le premier article du fait du faible nombre d'observations sur le support commun.

chacun de nos articles nous discutons de la direction des biais potentiels susceptibles d'affecter nos résultats. Il est important de noter que l'indicateur du handicap que nous utilisons dans les trois articles présente des limites. En effet, le module des questionnaires d'enquête qui est dédié au handicap n'est pas nécessairement formulé de manière à distinguer le handicap permanent d'une limitation fonctionnelle temporaire causée par un problème de santé. Le questionnaire Ougandais est une exception car on y demande aux individus d'indiquer l'année de survenue du handicap; et nos calculs indiquent que 62% des personnes handicapées de l'échantillon ont un handicap qui dure depuis deux ans ou plus. Ainsi, lorsque l'analyse est faite à l'aide d'un modèle à effets fixes, nos résultats peuvent refléter l'effet de la survenue d'un handicap temporaire dû à des problèmes de santé (plutôt que d'un handicap permanent) sur nos différentes variables dépendantes. L'utilisation de notre indicateur du handicap et du modèle à effets fixes constitue une limite de notre étude. Toutefois, nous utilisons ce modèle et cette mesure faute d'une meilleure alternative.

Nous allons à présent exposer successivement chacun de nos trois articles. Le chapitre 1 présente notre premier article, tandis que les chapitres 2 et 3 correspondent respectivement au deuxième et au dernier article.

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PREMIER CHAPITRE -
PARENTAL DISABILITY, CHILD LABOUR AND HUMAN CAPITAL IN ETHIOPIA

ABSTRACT

Whereas disability was invisible in the Millenium Development Goals (2000-2015), a growing awareness of the vulnerability of disabled people and their families has advocated for disability-inclusive Sustainable Development Goals (2015-2030) (United Nations, 2014). People with disabilities represent 15% of the world population and they are exposed to socioeconomic disadvantages that affect their wellbeing as well as their children's lives (World Health Organization and World Bank, 2011). Disability may deprive parents of resources necessary to invest in their children's human capital (education and health). Moreover, sons and daughters of disabled people may be exposed to child labour, an activity that could be detrimental to their schooling and health. Since children's human capital lays the cornerstone for their future life and plays a crucial role in the socioeconomic development of a society, any factor likely to compromise human capital accumulation must be paid careful attention.

Using panel data from Ethiopia, we rely on a fixed effects model for our analysis. Our results show that the influence of parental disability onset on child outcomes varies according to the gender of the parent. Maternal disability onset has a positive impact on child labour while fathers' disability onset affects child human capital. Further analysis reveals that compared to their brothers, girls' human capital accumulation is more hindered by parental disability onset.

1.1. INTRODUCTION

While some health issues have little effect on people's lives, a disability shock certainly has the possibility of changing a household's life path because of longer lasting consequences (Anderson et al., 2014). In line with the International Classification of Functioning, Disability and Health, disability refers to functional limitations[5]. People with disabilities (PWDs) are the world's largest minority according to the United Nations (Bristo et al., 2014; Laddha, 2016); they represent 15% of the world population and 80% of them live in developing countries (WHO, 2011). Although they form one of the most marginalized and vulnerable groups in society (Mulligan and Gooding, 2009), they have not received all the attention they deserve. For instance, none of the Millenium Development Goals (2000-2015) explicitly mentioned disabled persons. In an attempt to reverse this trend, the Sustainable Development Goals (2015-2030) include PWDs[6]. Across the world, disabled people experience more socio-economic disadvantages than their non-disabled peers. Yet, disability may have pernicious effects not only for PWDs' wellbeing, but also for the lives of their relatives, in general, and their children in particular.

In accordance with the household decision model (and generally in developing countries) fathers allocate their time between market work and leisure while mothers split their time among home production, child rearing, labour market activities and leisure. For their part, children divide their time between education, domestic work,

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[5] A person has functional limitations when, due to health issues, he lacks the physical, cognitive or psychological ability to independently perform activities. These functional limitations may be innate or not.

[6] In fact, "disability" is explicitly mentioned in five of the 17 goals. Goal 4:"Guaranteeing equal and accessible education by building inclusive learning environments and providing the needed assistance for persons with disabilities". Goal 8: "Promoting inclusive economic growth, full and productive employment allowing persons with disabilities to fully access the job market". Goal 10: " Emphasizing the social, economic and political inclusion of persons with disabilities". Goal 11: "Creating accessible cities and water resources, affordable, accessible and sustainable transport systems, providing universal access to safe, inclusive, accessible and green public spaces". Goal 17:"Underlining the importance of data collection and monitoring of the SDGs, emphasis on disability disaggregated data".

leisure and market work (Brown, Deardorff and Stern, 2002; Edmonds, 2007). Thus, when a disability shock affects a parent, the household can be constrained on the one hand to reschedule its members' time use, and on the other hand to redefine its budget planning. This time reorganisation can, for example, lead to a reallocation of a child's time from his/her[7] other activities to labour, while resource reallocation can involve a reduction of the amount of resources dedicated to child health and education. To paraphrase Anderson *et al.* (2014), disability happens to the family and not to PWDs alone. In our paper we focus on three dimensions of a child's life that may be affected: labour[8], education and health. These outcomes have been chosen for reasons presented in greater detail below.

Disability may lead to poverty for the individual through many channels such as lower educational attainments[9], poor health outcomes and unemployment or underemployment experienced by the disabled person (WHO, 2011). Since PWDs might depend on relatives for their livehood, the handicap can be a source of constraint for the disabled's family in general and his children in particular. The latter may have to be (more) involved in market work in order to improve their household economic situation or to compensate for the income loss incurred by their disabled parents. As stated by Haile and Haile (2012), to make ends meet and avoid putting the existence of the family at risk, poor families sometimes have no choice but to make their children join the labour market. Such a statement is in accordance with the two axioms introduced by Basu and Van (1998) to formalize child labour. According to the first one, known as the "substitution axiom", parental and child work are substitutes. The second axiom called the "luxury axiom" stipulates that parents are altruistic and push children to join the labour market only if they face financial hardships.

[7] In the rest of this paper, we will use « his » instead of « his/her » in order to lighten the text.
[8] "Labour" here refers to any work carried out by children such as farming, chores, etc.
[9] If there is a disability onset at early stages of life.

Children living with a disabled parent may also have to be (more) involved in housework in order to support their mother[10] if she has to take care of her disabled partner, to substitute for his market work or if she is the one affected by the handicap. Work[11] per se can be a beneficial activity for the child since it contributes to the accumulation of skills that have positive effects during the lifespan. However, work can be a harmful activity that should be prohibited if it affects a child's health (mental/physical) or interferes with his education (ILO, 2015).

Besides child labour, this paper is concerned with child human capital[12] (educational and health outcomes). Since child human capital lays the cornerstone for future earnings and general wellbeing (Feeny and Ouattara, 2013; Mont and Nguyen, 2013), it seems appropriate to investigate how education and health can be influenced by parental disability. Concerning educational outcomes, Mont and Nguyen (2013) present three mechanisms through which parental handicap may impact child education. First of all, and following the arguments presented above, children may have to reallocate their time from school to economic activities following a parental disability onset. Secondly, children can also dedicate less time to schooling in order to take care of the disabled parent or to substitute for their parents in household chores. Finally, disability can reduce parental involvement in a child's education. Regarding health outcomes, parental disability can have direct and indirect effects on child health. The direct influence arises because of the genetic link between generations (for example the Usher Syndrome is an inherited health condition which major symptoms are hearing loss and deterioration of vision) while the indirect effect operates through low income and/or a low level of education that prevents parents from investing in child health (Currie and Almond, 2011; Kuehnle, 2014).

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[10] The focus on the mother here is due to the fact that between both of the parents, she is generally the one in charge of domestic work and this is particularly true in the african context.

[11] We refer here to any work (domestic work included) performed by the child in accordance with the law, thus such work does not have any pervasive effect on the child (i.e. it does not affect his health or interfere with his education).

[12] Human capital can be defined as skills embodied in people that influence future monetary income. Education and health are its major components (Teixeira, 2014; Weiss, 2015).

The literature regarding intergenerational effects of disability tends to focus on the impact of child disability on parents' lives. Studies analysing the consequences of parental disability on children's outcomes remain markedly scarce. Moreover, results presented in existing studies, generally, reflect a correlation and not a causal relationship since the possible endogeneity of the indicator of disability is not taken into account. A correlation between parental disability and child labour, for example, does not necessary mean that the first variable causes changes in the second one. In fact, it is possible that a hidden factor such as parents' preferences influences both dependent and independent variables and creates a spurious relationship between regressands and regressors. For instance, parents with a high intertemporal-discount rate may have health-damaging habits making them more likely to suffer from a disability on the one hand; and to push their children to focus on labour instead of schooling because of these preferences on the other hand (Bratti and Mendola, 2014). It is important to identify the causal effect because if child labour is not determined by parental disability, interventions to tackle disability (by prevention [13] or treatment/alleviation[14] of disability) will not necessarily reduce child labour (Currie, 2009).

Randomized controlled trials and instrumental variables methods are known as two possible methods a researcher can use to address endogeneity. The former is costly and may be impossible for ethical reasons, while the latter is not obvious since it requires a valid instrumental variable that may not be available (Levinsohn *et al.*, 2013). When panel data are available, an alternative is to use a fixed effects model (this methodology and its limits are presented in details in section 1.4.).

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[13] For example, prevention of cataracts, that can lead to blindness, through the promotion of a healthy lifestyle (examples of risks factors: tobacco use, exposure to sunlight) or the prevention of paralysis due to polio by promoting immunization. Source: World Health Organization website. http://www.who.int/topics/cataract/en/; http://www.who.int/topics/poliomyelitis/en/

[14] For example, cataracts can be treated by surgery while orthotic devices can alleviate disability for some motor-impaired.

In this paper we focus on Ethiopia[15], a nation located in eastern Africa. The history of Ethiopia is filled with long periods of wars, droughts and famines (De Waal, 1991; Von Uexkull, 2014). Over time, the Ethiopian government has had to fight on several fronts; between 1977 and 1978, the border dispute also known as the "Ogaden war" opposed Ethiopia to Somalia. The longest armed conflict of the Ethiopian chronicles started in 1961 and opposed this country to Eritrea; the crux of the problem was the decision of the former to annex the latter. The war went on until the independence of Eritrea in 1991; this date also marked the end of a civil war that started in Ethiopia in 1974 and ended with the overthrow of the ruling regime. Seven years after their three-decades of war, Ethiopia and Eritrea were once again involved in fighting that stemmed from a border dispute and was shorter than the previous one (1998-2000). Besides its warfare, Ethiopia experienced several episodes of droughts and famines. The most severe famine occurred in 1983-1985 and killed more than one million people (Tafere, 2016).

It is well known that armed conflicts and famines are contributors to disability. Wars are sources of injuries and trauma that can lead to disabilities (WHO, 2011). Furthermore, malnutrition is a pathway through which famine may generate disabilities. There is evidence that nutritional deficiencies during childhood may result in mental impairments as well as visual disabilities (Maulik and Darmstadt, 2007; Susser, Clair and He, 2008; Demissie, and Solomon, 2011). It would have been interesting to identify the causes of disability in our study, in order to check if disability is due to wars or famines. However, such information was not collected during the survey and thus is missing in our data.

We have chosen to focus on Ethiopia because it is characterised by a high prevalence of PWDs. With a population of about 97 million, this nation is the second most

[15] It is worth noting that Ethiopia is not representative of other african countries. Since each country has its specificities, we do not assume in this paper that conclusion drawn from the Ethiopian context can be applied to other countries.

populous country in Africa[16] and PWDs account for 18%[17] of the population (WHO, 2011); in other words, more than 17 million Ethiopians are classified as disabled. Since 2005, Ethiopia has implemented the Productive Safety Net Program; this program's goal is to provide transfers to the population exposed to chronic food insecurity. The majority of the beneficiaries have to do some public work in return for transfers. However, eligible elderly and PWDs who are unable to work can receive transfers without any work requirement (Berhane, Gilligan, Hoddinott, Kumar and Taffesse, 2014). According to the most recent report of the Ethiopian Socioeconomic Survey (Central Statistical Agency, 2015) 3% of the population receive transfers from the program.

The vast majority (85%) of PWDs in Ethiopia live in rural area (MOLSA, 2010). Moreover, 95% of disabled Ethiopians live in poor households. Many PWDs either depend on income generated by self-employment for their living expenses or are reduced to relying on their relatives or begging (ILO, 2013). According to Narayana (2012), supplementing or improving household income is the main reason for children's participation in economic activities in Ethiopia.

An exploration of statistics centred on children shows that the incidence of child labour in Ethiopia is 27%[18], this is twice the proportion observed worldwide (13%). According to the International Labour Organization, child labour refers to any market or domestic work carried out by children that can affect their health and education. In

[16] Source: The World Bank Statistics of 2014 http://data.worldbank.org/data-catalog/Population-ranking-table

[17] According to the World Disability Report (WHO, 2011), results of the World Health Survey based on 55 developed and developing countries show that Ethiopia ranks 15th (backward sort) when comparing proportion of PWDs.The percentage of PWDs varies between 4% (Norway) and 36% (Swaziland). When comparing only the 15 Sub-Saharian countries of the sample, Ethiopia ranks 6th of the nations with the highest disability prevalence.

[18] Statistics on child labour come from the UNICEF website and present the situation of children aged 5 to 14 years old in 2014. The prevalence of child labour in Sub-Saharan Africa is 25%. Source: UNICEF website.
http://data.unicef.org/child-protection/child-labour.html

consonance with this international organisation (ILO, 2011), any hazardous work[19], done for at least one hour, should indeed be prohibited for those who are less than 18 years old. The agricultural sector is the sector with the highest proportion of working children in Ethiopia (Heissler and Porter, 2013). Agricultural activities may be unsafe because they can entail the absorption of toxic pesticides, the use of harmful tools or the carrying of heavy loads (USDL, 2012).

The effect of child labour on children's health or education depends on many factors such as work schedule, hours worked and type of work[20] (ILO, 2004; De Hoop and Rosati, 2014). Our calculations based on the most recent Ethiopian socioeconomic survey (ESS2, 2014) reveal that 44% of children aged between 7 and 17 years[21] are involved in economic activities. Children who work dedicate on average 29 hours/week to the labour market. Regarding human capital outcomes, 80% of children between 7 and 17 years old are enrolled in school while 11% of this age group have suffered from illness during the two months preceding the survey. That being said, it will be interesting to investigate if parental disability plays a role in the incidence of child labour in Ethiopia and whether it hinders child human capital accumulation. A better comprehension of the relationship between parental disability and the child outcomes of interest (child labour and human capital) in Ethiopia is crucial in order to inform the policies addressing child labour and children's human capital accumulation.

The contribution of this paper can be viewed from various perspectives. Firstly, this paper adds to the literature on the intergenerational effects of disability. In fact, our

[19] According to the ILO, work is identified as hazardous if " by its nature or the circumstances in which it is carried out, it is likely to harm the health, safety or morals of children" (ILO, 2011).
[20] For example, one hour spent on fields per week can be harmful for: 1) child health if he is involved in tobacco production 2) child education if that activity is carried out at a time when the child is supposed to be at school. Thus, there is a need for more detailed information for an accurate analysis regarding child labour. Due to the lack of such detailed information in databases, existing studies (ours included) rely on economic or domestic activities done by children, regardless of their dangerousness, as a measure of child labour.
[21] Those aged between 7 and 17 years since questions about work are only asked of people who are at least 7 years old (there is no upper bound).

paper is the first to consider the effect of parental disability on a crucial component of child human capital ignored by previous studies: health. Furthermore, existing papers focus on the probability of a child being enrolled in school as a measure of child education. Such a measure can be misleading since being enrolled in school and attending classes are two different realities. In a country that has adopted free basic education like Ethiopia, it is not surprising to record a high enrolment rate; yet, this is not sufficient if it is not coupled with child attendance at school since the latter plays a major role in academic achievement. Moreover, a study conducted by UNICEF (2010) presents absenteeism as a cause of children's low performance and repetition in Ethiopia. That being said, in this paper we consider absenteeism in addition to school enrolment.

Secondly, by providing evidence that parental disability fosters child labour on the one hand and represents an obstacle to child human capital accumulation on the other hand, this paper provides insight into the factors that public authority can address in order to enhance the wellbeing of children and of the society overall.

The remainder of this paper is organized as follows: Section 2 presents a literature review. Section 3 introduces the source of data used in this study. Section 4 provides the methodology. Section 5 presents the results of our analysis and finally Section 6 concludes.

1.2. LITERATURE REVIEW

Little is known about the repercussions of parental disability on child labour, children's educational and health outcomes. This may be explained by the fact that the economic literature concerned with the intergenerational effect of disability generally focuses on the situation of mothers with disabled children. Studies generally conclude that child disability represents a barrier to the labour supply of mothers (see Stabile and Allin, 2012, for a more complete literature review). Using

data from the USA, Powers (2001) finds a negative impact of child disability on maternal employment and the effect is stronger for single mothers. Wasi, van den Berg and Buchmueller's (2012) study, based on an American sample, also corroborates this conclusion. Moreover, their results reveal that the effect is more pronounced when a disability deprives the child from the ability to take care of himself.

Unlike the papers cited above, the analysis of Gupta, Das and Singh (2013) using Indian data shows that in urban areas, married mothers of a disabled child are more likely to work. According to the authors, this may be explained by the high cost (health expenditures included) of living in urban areas. When considering the intensive margin of labour supply, they find a negative relationship between this variable and child disability; that is, mothers of disabled children spend less time on the labour market. However, Gupta *et al.*'s results do not suggest any significant association between child disability and the labour supply behaviour of rural mothers. According to the authors, such a non-significant relationship is explained by two factors. Firstly, these women are generally involved in agricultural related tasks that can be done even with a child beside. Secondly, mothers can rely on their community networks (relatives or neighbours) to take care of their children when they are working.

Studies focusing on the influence of parental disability on at least one of the outcomes of interest in this paper (child labour, education or health) are markedly scarce. Raccanello and Garduno (2012) analyse the relationship between parental impairments (visual, hearing, etc.) and two child-level outcomes in Mexico: child labour and education. Children in their study are aged between 14 and 17 years. Using a multinomial logistic[22] model they find no evidence that parental impairments lead children to leave school in order to join the labour market. Actually, according to

[22] Their dependent variable "activity" has 4 categories: 0 if the child neither attends school nor work (reference); 1 if the child works and attends school; 2 if the child only attends school; 3 if the child only works.

the authors, children living with a disabled parent are more likely to drop out of school and become idle probably because of a lack of parental supervision. It is worth noting that they do not control for endogeneity in their study. Contrary to Raccanello and Garduno (2012), Mont and Nguyen (2013) exclude child labour from their analysis. Applying Two Stages Least Squares (2SLS) on a Vietnamese sample, they find that parental disability diminishes a child's probability of being enrolled in school and of completing the number of grades expected. Furthermore, the effect is more pronounced when the disabled parent is the mother. They also find that in terms of schooling outcomes, boys are more affected than girls. They use parents' age and the incidence of disability in the district as instruments for parental disability. However, the validity of their instruments are questionable. For instance, parental disability may not be the only channel through which parents' age influences child school enrolment; indeed, parental age can affect child school outcomes through parents' tastes and preferences that change across time. Regarding disability prevalence, districts with high disability prevalence may be mainly populated by fatalists who are not convinced of the necessity to invest in child human capital.

Alam (2015) employs a fixed-effects model in his study. Here, disabled are those who declare that during the four weeks preceding the survey they were not able to conduct their usual tasks for at least one day because of health issues. This is another measure of disability found in the literature (Schultz and Tansel, 1997; Mitra *et al.*, 2016). His data come from four waves of a longitudinal survey conducted in the Kagera region of Tanzania (1991-1994) and children are those aged between 7 and 15. Using Ordinary Least Squares (OLS) estimates with child fixed effects, he finds that only father's illness[23] has a negative effect on child school enrolment. Long-term effects are also observed since children with a sick father are less likely to complete primary school and thus have fewer years of schooling. The effect of father disability on child education occurs through the decrease in household income that prevents the

[23] It is worth recalling that in the literature, an illness that prevents someone from conducting his usual activities is considered as a disability (see Schultz and Tansel, 1997; Mitra *et al.*, 2016).

family from affording school related expenses[24]. However, there is no evidence that a father's illness leads children to reallocate their time from school to work. Only a mother's illness pushes children to be involved in labour market activities. An attempt to understand if the effect of parental sickness differs depending on a child's gender shows that there is no differential effect by child gender for education and child labour.

Other existing papers interested in the impact of parental health on child labour or child human capital use measures of health shocks other than disabilities. A fixed effects model is also used by Bratti and Mendola (2014) who, unlike the previous studies, consider older children; that is those aged between 15-24 years in Bosnia and Herzegovina. They do not find any effect of fathers' health status on children's outcomes. A person is considered as "ill" if he reports his health condition as poor or very poor (instead of excellent, good or fair) over the last 14 months. Their results show that only mothers' health status has a significant impact on child outcomes; in other words, it decreases the probability that a child is enrolled in school and increases his probability of being employed.

Dillon (2012) also uses child labour and schooling as regressands in his analysis but the main difference between his paper and the two previous studies lies in the fact that his explanatory variable is the health of any adult in the household including parents. His sample is composed of Malian children aged between 10 and 17 years. An adult is affected by a health shock if he has been unable to work at least one day during the previous month due to illness. He uses a fixed effects model and finds a positive relationship between adult male illness and the probability of a child being involved in childcare (of their younger siblings). According to the author, when men are sick in the household, women have to take care of them and substitute for male labour; thus they have less time for childcare. There is no evidence that an adult male

[24] In his paper, he uses consumption expenditures as a proxy of household income and finds that a father's disability has a negative impact on household income.

illness increases the number of hours spent by a child in household enterprises. He also investigates time spent by children in different activities and finds that men's illness increases hours in schooling and economic activities usually managed by women[25]. However, when women are sick, children spend more time on childcare, but there is no evidence of an effect of female illness on child educational outcomes.

The remaining papers presented below are interested in only one of our child outcomes of interest, that is child labour or health. Using data from Bangladesh, Bazen and Salmon (2010) evaluate the effect of a father's illness on child (5 to 14 years old) and maternal work. People experiencing a health shock are those who suffered from a chronic disease during the last 12 months or experienced a medical treatment during the last 30 days. The authors apply a bivariate probit model and use a likehood ratio test to show that father's health is exogenous[26]. They conclude that a father's illness increases both child and maternal work. Kebede (2005) is concerned with the intergenerational transmission of health in Ethiopia. In his study, children are those who are 10 years old or younger and the analysis is carried out using a fixed effect model. His results do not show any evidence that income is the transmission mechanism between parental health (measured by height) and child health (measured by height-for-age *z*-scores). However, his findings reveal that the pathway between parental and child health is direct and explained by genetic inheritance. The importance of genetic transmission mechanisms for intergenerational health (health measures are asthma, severe headaches, diabetes and hay fever) persistence is corroborated by Thompson's (2014) research on Americans who are at most 17 years old.

To summarize this literature review, there is evidence that parental disability may represent a barrier to child human capital accumulation on the one hand, and increase child labour on the other hand. However, the effect may depend on the gender of the

[25] The author does not explain why men's illness has a positive effect on children's education though such a finding seems paradoxal.
[26] However, the reliability of such a test is questionable (Teele, 2014).

disabled parent. It is worth noting that existing papers do consider child health though it is a crucial component of human capital. Moreover, school absenteeism is not investigated despite its incontestable role in school achievement.

A formal summary of hypotheses drawn from the existing literature (Ravallion and Wodon, 2000; Edmonds, 2003; Khanam, 2004) is presented in what follows. Let us assume that the household is only composed of parents and their children. Parents' utility U depends on the amount of health related goods and services H consumed by the household. A disability shock leads to an increase of H, so that $H=H(D)$. H is composed of two elements: $H=Hp+Hc$. Hc corresponds to the amount of health related goods and services consumed by children while Hp corresponds to the amount of health related goods and services consumed by parents. U also depends on the level of children's human capital; that is, their health (h_c) and education (e_c). The other factors that determine U are the household's consumption of non-health/non-education related goods and services (C) and unobservable variables k, such as their social network, that may influence parents' utility. A child's health h_c depends on Hc, C, and unobservable factors g such as accidents. Regarding child education or knowledge e_c, its level depends on the time dedicated by the child to studies S (so that an increase in S has a positive impact on e_c) and unobservable factors b like child's skills. That being said, parents' utility function can be written as follows:

$U=U\ (Hp,\ h_c,\ e_c,\ C,\ k)$

Since $h_c=h(Hc,\ C,\ g)$ and $e_c=e(S,\ b)$, U can be written:

$U=U\ (Hp,\ Hc,\ S,\ C,\ k)$ or $U=U\ (H(D),\ S,\ C,\ k)$

Let us assume that we are in a context where education is free[27] so that parents do not have to spend money when it comes to child education. The household's budget constraint can be written as follows:

[27] Ethiopia is characterised by free education in primary and secondary school. For simplication, in our model, we assume that there are no school related expenditures e.g. uniforms, etc.

$$C + Hp + Hc = Y + W$$

In the equation presented above, *Y* represents income provided by parents while *W* is the time dedicated by children to economic activities. and wages have been normalised to one.

If we assume that a child's time is only divided into three components, that is economic activities (*W*), domestic activities (*V*) and education (*S*), we will obtain the following time constraint for children: *W + V + S = 1,* where the total time is normalized to one. The combination of the budget and the time constraints produces the following equation:

C + Hp + Hc + S + V = Y + 1. The household's problem can be stated as:

Max *U=U (Hp, Hc, S, C, k)* subject to: C + Hp + Hc + S + V = Y + 1

The signs of the first order conditions for *Hp, Hc, S* and *C* respectively are the following.

$$\frac{\partial U}{\partial Hp} > 0; \frac{\partial U}{\partial Hc} > 0; \frac{\partial U}{\partial S} > 0; \frac{\partial U}{\partial C} > 0$$

In its pure investment theory, Grossman (1972) stipulates that a poor health affects people's labour supply and thus income. In extension, disability [28] *D* has a negative impact on parental income Y.

$$\frac{\partial Y}{\partial D} < 0$$

Furthermore, in line with the theoretical framework proposed by Mitra et al. (2016), a health shock should leads to an increase in household health expenditures and reduces the amount of financial resources available for consumption of non-health related

[28] D may be viewed as the severity of disability; it is a continuous variable that varies between 0 and 1, so that for a non-disabled person D=0.

goods and services. Let denotes H the total health expenditures at the household level. *H=Hc + Hp*. Thus, a parental disability (*D*) will increase *H* through an augmentation of *Hp*. In order to cope with the increase of *Hp* and a decrease of *Y* (in line with Grossman's model), the household will reduce its investment in child health (ie *Hc* will decrease). Furthermore, children will dedicate more time to work (see substitutability and luxury axioms) and reduce the time dedicated to education *S* (see the time constraint). That is: $\frac{\partial Hc}{\partial D} < 0$; $\frac{\partial S}{\partial D} < 0$. Thus the effects on h_c and e_c are:

$$\frac{\partial h_c}{\partial D} = \frac{\partial h_c}{\partial Hc} . \frac{\partial Hc}{\partial D} < 0 \; ; \; \frac{\partial e_c}{\partial D} = \frac{\partial e_c}{\partial S} . \frac{\partial S}{\partial D} < 0$$

In line with the luxury and the substitution axioms, parental and child work are substitutable but since parents are supposed to be altruist (Basu and Van, 1998), their offspring is involved in child labour only if there is no better alternative[29]. Thus, there is a positive relationship between parental disability and child involvement in economic (*W*) and domestic (*V*) activities.

$$\frac{\partial W}{\partial D} > 0; \frac{\partial V}{\partial D} > 0$$

The signs (of the derivations) presented above are those obtain whether *D* represents a father's disability or a mother's disability. According to Becker's theory on gender division of tasks (Becker, 1985), domestic activities in households are mainly carried out by females so that they spend less time in the labour market compared to males. Thus, in households, males are those who spend more time in the labour market and thus are the main household bread-winner.

That being said, we expect paternal disability to have more negative effect than maternal disability on households' income *Y* and child human capital (h_c and e_c). We

[29] Thay may also be due to the fact that parents are not aware of the potential negative effect of child labour on their children's lives.

denote paternal and maternal disability D_P and D_M respectively, in absolute terms we can write:

$$\left|\frac{\partial Y}{\partial D_P}\right| > \left|\frac{\partial Y}{\partial D_M}\right|;\ \left|\frac{\partial h_c}{\partial Hc}\cdot\frac{\partial H}{\partial D_P}\right| > \left|\frac{\partial h_c}{\partial Hc}\cdot\frac{\partial H}{\partial D_M}\right|;\ \left|\frac{\partial e_c}{\partial S}\cdot\frac{\partial S}{\partial D_P}\right| > \left|\frac{\partial e_c}{\partial S}\cdot\frac{\partial S}{\partial D_M}\right|$$

In accordance with the theories of gender division of tasks and the axioms of luxury and substitution, we expect children to be more involved in economic activities when the father becomes disabled than when the mother becomes disabled. However, a mother's disability pushes children to be more involved in domestic activities than a father's disability does. That is:

$$\left|\frac{\partial W}{\partial D_P}\right| > \left|\frac{\partial W}{\partial D_M}\right|;\ \left|\frac{\partial V}{\partial D_P}\right| < \left|\frac{\partial V}{\partial D_M}\right|$$

We will now talk about the effects of parental disability on children depending on the gender of both the parent and the child. As highlighted by the theory of gender division of task, girls are more likely to be involved in domestic activities than boys do. Thus, following paternal or maternal disability, boys will be more involved in economic activities than their sisters, but the opposite will be observed when it comes to domestic activities. We denote W_G and V_G the time dedicated by girls to economic and domestic activities respectively. By the same token, W_B and V_B correspond to time boys spend in the labour market and doing chores respectively. We will have:

$$\left|\frac{\partial W_G}{\partial D_P}\right| < \left|\frac{\partial W_B}{\partial D_P}\right|;\ \left|\frac{\partial W_G}{\partial D_M}\right| < \left|\frac{\partial W_B}{\partial D_M}\right|;\ \left|\frac{\partial V_G}{\partial D_P}\right| > \left|\frac{\partial V_B}{\partial D_P}\right|;\ \left|\frac{\partial V_G}{\partial D_M}\right| > \left|\frac{\partial V_B}{\partial D_M}\right|$$

The pure investment theory highlights the fact that investment in human capital depends, like any asset, on its return (Delelegn, 2007). This statement corroborates the human capital theory (Becker, 1960; Becker and Lewis, 1973) which states that parents invest in their children's human capital because of the returns it is associated with. For example, children with a higher level of human capital will be more likely

to receive higher earnings in the future. However, due to the gender division of tasks mentioned above, boys are more likely than girls to get higher earnings in the future. That being said, parents will attach more importance to boys' human capital accumulation than girls' human capital accumulation; resources and time dedicated to human capital accumulation will then be lower for girls compared to boys. Let e_G and h_G denote girls education and health respectively, while e_B and h_B correspond to boys education and health respectively. In what follows, D represents either paternal disability or maternal disability. We can write:

$$\left|\frac{\partial e_G}{\partial S_G}.\frac{\partial S_G}{\partial D}\right| > \left|\frac{\partial e_B}{\partial S_B}.\frac{\partial S_B}{\partial D}\right|; \left|\frac{\partial h_G}{\partial H_G}.\frac{\partial H_G}{\partial D}\right| > \left|\frac{\partial h_B}{\partial H_B}.\frac{\partial H_B}{\partial D}\right|$$

It is worth noting that factors like household size, child age and natural disasters may have an effect on children outcomes. Households with large size or those who are affected by natural disasters are more likely to be poor, thus children living in these households are more likely to be put to work and to receive less human capital investment. Regarding child age, the older the child, the higher his probability to work and the lower his chances to benefit from human capital investment.

The first hypothesis we aim at testing in our analysis is that, due to the drop in income following a parental disability onset, children will be more likely to work and less likely to attend school or to be healthy. Furthermore, the effect of paternal disability will be more pronounced than that of maternal disability. The second hypothesis to be tested is that girls' human capital will be more affected than that of boys following a parental disability onset. Moreover, a child assignment to a specific type of work will depend on his gender. Following, the literature review, the next section will be dedicated to the presentation of the source of data used for our analysis.

1.3. SOURCE OF DATA

The Ethiopia Socioeconomic Survey is used to analyse the impact of parental disability on child outcomes. These are panel data consisting of two waves (ESS1 and ESS2). The first wave (2011/2012) is representative of rural and small town areas in the country and is composed of 3969 households. In order for the data to provide inference for all of Ethiopia, an urban sample supplement was added to the ESS1 to produce the ESS2 (2013/2014) that contains information collected from 5262 households. Thus, panel data available for our study are mostly composed of people living in the rural area where more than two-thirds (70%[30]) of PWDs are located[31]. Information used in this study was collected during the post harvest period, that is between January and March 2012 for the 1st wave (Central Statistical Agency, 2013) and from January to February 2014 for the second wave (Central Statistical Agency, 2015). There is a two-year gap between the waves used for our study. For household members who are 10 years old or younger, the survey questions are asked of the caregivers. Questions related to market or domestic work concern only people aged 7 and above. Therefore, our sample of children consists of those aged between 7 and 17 years[32]; this upper bound is in accordance with the one adopted by UNICEF when defining a child.

The available information about disability in surveys generally comes from self-declarations. Self-reported disability measures may be criticised because of their subjective nature that can lead to measurement error (Oguzoglu, 2012). In fact, socio-economic characteristics may influence how people evaluate their health. Moesgaard, Iburg, Salomon, Tandon and Murray (2002) for instance conclude that given the same level of physician-assessed mobility, women are more likely than men to report functional limitations. They also find that compared to poor people, wealthy people

[30] Statistics calculated by the author based on ESS2.
[31] Only households living in rural and small towns can be followed during the two waves. So the urban area in our sample corresponds to small towns.
[32] That is, we keep only children who can be followed during the 2 waves and who are at least 7 years old in the first wave and at most 17 years old in the second wave.

have a higher propensity of reporting mobility issues. Disability measures are considered as objective when the information about functional limitations comes from medical professionals. However, in the absence of objective measures in many developing country databases, the use of self-evaluated disability becomes the only alternative for a researcher (Mitra, Posarac and Vick, 2013).

In order to check the disability status of respondents, the set of questions recommended by the Washington Group on Disability Statistics[33] are included in the Ethiopian questionnaire. Interviewers are asked to mark one of a set of 4 answers (1- No difficulty; 2- Yes, some difficulty; 3- Yes, a lot of difficulty; 4-Cannot perform activity at all) after each of the following 6 questions: 1-Do you have difficulty seeing, even if you are wearing glasses? 2-Do you have difficulty hearing, even if you are wearing a hearing aid? 3-Do you have difficulty walking or climbing steps? 4-Do you have difficulty remembering or concentrating? 5-Do you have difficulty (with self-care such as) washing all over or dressing, feeding, toileting etc? 6-Using your usual language, do you have difficulty communicating; for example understanding or being understood? Following, Mitra and Sambamoothi (2008) and Mont and Nguyen (2013), people in our study are considered as non-disabled if their answers following all the 6 questions are "No difficulty", otherwise they belong to the PWDs group.

It is worth noting that when questions like "Do you have a disability" or "Do you have a hearing, speech, visual, mobility, and mental disability?" are used as disability screening questions in surveys, the assessed prevalence of disability in developing countries is low (Palmer and Harley, 2011). Under-reporting may be explained by the fact that the term disability carries a stigma. Thus, people tend to deny their disability or to hide the fact that they have a disabled relative (Hari, 2016). For example, in Zambia, the prevalence of disability changes from 1% when the question is "Do you have a disability" to 13% if the Washington Group' s questions are used (Palmer and

[33] "The Washington Group on Disability Statistics was set up by the United Nations Statistical Commission in 2001 as an international, consultative group of experts to facilitate the measurement of disability and the comparison of data on disability across countries". (WHO, 2011; p.26)

Harley, 2011); a disability prevalence of 1% is purely unrealistic in the context of a developing country. That being said, the United Nations recommend the use of this latter measure rather than the former for disability assessment in censuses and surveys. However, it is worth highlighting that the health status assessed using the Washington Group's questions may be anything but a temporary disability. For example, if during the a survey a tetraplegic (identified as X) is asked: "Do you have difficulty walking or climbing steps?", his answer will be: "Unable to do it at all". If the question is asked to someone (identified as Y) who is bedridden because of Malaria, for example, he too will answer: "Unable to do it at all". Despite the fact that answers provided by X and Y are both correct, it appears that only X is a permanent disabled person while Y is suffering from a temporary disability due to poor health conditions. However, X and Y will both be recorded as "disabled person" in the database generated from the survey questionnaires. Therefore, it clearly appears that additional questions need to be added to questionnaires in order to differentiate "permanent disabled" from "temporary disabled" individuals. In this research work, we will rely on the Washington Group's questions despite their limitations due to the lack of a better measure such as disability assessment by the medical staff.

Survey questions about time use provide information on market work as well as domestic work. Children are considered as being involved in domestic activities if they spent any time collecting water or firewood the day preceding the enquiry. It would have been interesting to include other components of domestic work (such as childcare, cooking, cleaning the house, doing laundry, etc); unfortunately, the database does not include this information. A longer time horizon is asked of market work related questions in the survey. Information collected here is the number of hours spent, by children, doing each of the following activities during the seven days preceding the survey: household agricultural activities (including livestock and fishing-related activities whether for sale or for household use), running non-agricultural household business for himself or the household, paid work, part-

time/temporary work. People who dedicated any time to at least one of these activities are included in the "workers" group.

In order to capture the effect of parental disability on child human capital, we consider 3 binary dependent variables: school enrolment, school absence and health issues. The variable "school enrolment" is coded 1 if the child is enrolled in school and 0 otherwise[34]. For those who are enrolled in school, there is a question in the survey that allows us to know if children were absent (school absence=1) from school for more than one week during the month preceding the survey. Finally, there is a question regarding whether people have faced any health problem during the two months preceding the survey (health issues=1). The methodology used to analyse our data is presented in the following section.

1.4. METHODOLOGY

Consider the specification below that presents the relationship between parental disability and child outcomes. Here, Y_{it} is the dependent variable (work, education or health) representing the situation of child *i* at time *t*[35]. β_0 is the constant term, β_1 and β_2 are coefficients associated with the father's disability status and the mother's disability status respectively. γ is the vector of coefficients associated with the controls. $D_F=1$ if the father is disabled and 0 otherwise[36]. In the same manner, $D_M=1$ if the mother is disabled and 0 otherwise. *X* is a set of controls that include household size, the child's age group and a dummy variable for natural shocks. This latter variable indicates if, during the 12 months preceding the survey, the child's household has been affected by a natural disaster likely to be harmful to their

[34] The question is: "Are you currently attending school? "

[35] It is possible that the dependent variable suffers from measurement errors as well, for example there may be the tendancy to underreport hours worked by children. As stated by Davidson and Mackinnon (2004), measurement error in the dependent variable is generally of no great consequence. In fact, measurement error in the dependent variable will increase the variance of the error terms and this is generally not a serious problem. However, measurement error in the independent variables lead to both an increase in the variance of the error term as well as the correlation between the independent variable and the error term.

[36] D is not viewed as a continious variable anymore but as a binary variable.

agricultural production (drought, flood, landslides/avalanches, heavy rains preventing work, other crops damage). μ_i represents child fixed effects (individual unobservable characteristics that are time-invariant such as gender, genetic endowment or ability) while λ_t corresponds to time fixed effects (factors unobservable, by the researcher, that influence everyone in a specific area at a given time such as policies). ε_{it} is the idiosyncratic error term ie unobservable characteristics that change over time and across individuals.

$$Y_{it} = \beta_0 + \beta_1 D_{Fit} + \beta_2 D_{Mit} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Our strategy consists of running fixed-effects regression using Ordinary Least Square (OLS). This allows us to control for child fixed effects μ_i as well as time fixed effects λ_t as stated above. However, this method has some limits. The first drawback is its inability to control for unobservable heterogeneity that changes across individuals and through time. Secondly, the estimation of a coefficient is possible only if the associated regressor varies across time. For example, the effect of children's gender on their education cannot be estimated because a child's gender does not vary over time. By the same token, we can estimate the effect of D_F on Y only if paternal disability status varies over years. Since we do not have a better alternative, we rely on the fixed effects model despite its drawback.

OLS with robust standard errors are used to estimate our regressions whether the dependent variable is continuous (eg: hours worked) or discrete (eg: probability of work). Two arguments are generally made against the use of OLS when the dependent variable is binary. The first drawback is the presence of heteroscedasticity in the regression. However, this problem can be addressed with robust standard errors. The second flaw is that the predicted probability can be outside of the 0-1 interval. However, the OLS method allows easier interpretation of coefficients than logit/probit (Ashraf, 2009). Since the advantages of the OLS method outweigh its

disadvantages in our opinion, we will use it in this study. Results of our analysis are presented below.

1.5. RESULTS

In this section we present the descriptive statistics as well as the results we got from our estimations.

1.5.1. Descriptive statistics

The descriptive statistics presented here are based on the first wave of the Ethiopian panel composed of 1997 observations[37] (Table 1.1). While 16% of the children live with a disabled father, 9% have a disabled mother[38]. It is worth noting that the possibility of an underestimation of the proportion of disabled people in the Ethiopian survey cannot be excluded. As stated by Getachew (2011), many people hide or never declare a disability because of the stigma associated with such a health condition in Ethiopian society. It would have been interesting to disaggregate our sample of PWDs, that is generating subsamples according to the type and/or the severity of disability. However, our sample of disabled people is not large enough to allow this kind of analysis in the present study.

As shown in table 1.1 below, 28% and 34% of children of our sample are teenagers (13 to 17 years old) respectively in the first and the second wave. 54% of the children have worked (economic activities) during the week preceding the survey, but this statistic corresponds to 56% in the second wave. The average number of hours worked per week among children rises from 11 to 13 during the two waves; however, when we consider only those who work that statistic corresponds to 21 and 25 hours

[37] Actually, 3023 children aged from 7 to 17, and living with both of their biological parents could be followed through waves; however, we could not keep them all for our analysis due to missing data. For example, in the first wave, information about school enrolment status is missing for 801 children. We restrict our sample to biological parents/children because, as stated by Case, Paxson and Ableidinger (2004), a parent's altruistic behaviour may depend on the relatedness to the child; that is, he may prefer investing in his biological child than an adopted one.

[38] Decomposition by type of disability is presented in Appendixes 1 and 2.

respectively. We notice that hours worked are mainly dedicated to agriculture. According to our data, during the first wave, working children spend on average 19 hours/week in the agricultural sector, this is 90% of time spent in economic activities[39]. This figure corresponds to 23 hours/week during the second wave. During the first wave and the second wave respectively, 45% and 44% of children have been involved in water/firewood collection during the day preceding the survey and the time spent doing these chores (for those who have effectively been involved) is about two hours on average. Concerning educational outcomes, during the first wave, 93% of children attend school and 13% of those students have been absent from school for more than one week during the month preceding the interview. These statistics correspond to 90% and 15% respectively during the second wave. This high level of school enrolment is probably explained by the free-fee policy in place since 1994 for grades one through ten in Ethiopia (World Bank, 2009; Chicoine, 2016). Regarding health, the proportion of children with health issues during the two months preceding the survey is 13% during the first wave and 15% during the second wave. The average household size is seven during both waves. During the first and the second wave respectively, 22% and 15% of the children in the sample live in households that have been affected by a natural disaster during the 12 months preceding the survey. It is worth noting that 90% of the children in our sample live in rural areas while 10% are located in small towns whatever the wave considered.

[39] That is, the remaining 10% is dedicated economic activities other than agriculture.

Table 1. 1
Descriptive statistics (sample of children)

	Wave 1		Wave 2	
Variables	Mean	Standard deviation	Mean	Standard deviation
Work 1=work during the 7 last days 0=otherwise	0.541	0.498	0.558	0.470
Hours work Hours worked during the 7 last days (hours>0)	20.379	14.732	24.456	18.353
Hours worked during the 7 last days (hours≥ 0)	11.106	14.885	12.830	17.670
Hours work (agriculture) Hours worked during the 7 last days (hours in agriculture>0)	19.419	14.480	23.048	17.713
Hours worked during the 7 last days (hours in agriculture≥ 0)	9.325	13.957	10.982	16.934
Chore 1=wood or water collection yesterday 0=otherwise	0.451	0.498	0.443	0.394
Hours chore Hours dedicated to wood/water collection yesterday (hours>0)	1.899	3.326	1.828	1.537
Hours dedicated to wood/water collection yesterday (hours≥0)	.857	2.425	0.352	0.986
School enrolment 1=currently attending school 0=otherwise	0.930	0.255	0.899	0.338
School absence 1=absent from school last month for more than a week 0=otherwise	0.126	0.332	0.156	0.230
Health issues 1= any health problem during the last 2 months 0=otherwise	0.131	0.338	0.154	0.305
Disabled mother 1=mother is disabled 0=otherwise	0.0936	0.291	0.215	0.257
Disabled father 1=father is disabled 0=otherwise	0.163	0.369	0.346	0.336
Teenager 1=[13-17] 0=[7-12]	0.279	0.449	0.342	0.500
Household size	7.143	1.837	7.178	1.908
Natural shock 1=household affected by a natural phenomenon 0=otherwise	0.216	0.412	0.149	0.356
Rural 1=lives in rural area 0=lives in a small town	0.903	0.296	0.903	0.296
Observations	1997		1997	

Sample of children aged between 7 and 17.
Source: Author's calculations based on data from ESS.

1.5.2. Regressions

In our sample, 234 and 366 children have a mother and a father respectively who experience a disability onset between the two waves. Information available in the dataset does not allow us to identify the causes of the disability onset. Furthermore, as stated previously, what we call "disability" may be an illness that must not be categorised as "permanent disability". However, we do not have a better disability measure and throughout our text we will use the expression "disability onset" to identify the observed disease onset. It is worth noting that when we jointly use such a measure and a fixed effects model for our analysis, our results may reflect the impact of the onset of a temporary disability due to poor health conditions (other than a permanent disability) on the outcomes of interest. Thus, we shall keep this in mind while interpreting our results.

Effects on child work

The estimation of our regressions shows that having a mother who experiences a disability onset increases the likehood for a child to be involved in economic activities (table 1.2, column 1). In fact, compared to children whose mother does not experience a disability onset, children with a disabled mother have a 9 percentage point (pp) higher probability of work (the coefficient is significant at the 10% level). Regarding the intensive margin of work, we find that when a mother becomes disabled, the number of hours dedicated by her child to economic activities is higher than those of his peers whose mother does not experience a disability onset between the two waves. In fact, when we consider the entire sample, we notice that children whose mothers become disabled spend 3 extra hours/week doing economic activities (column 2); this figure doubles when the analysis is restricted to those who have been involved in economic activities during both waves (column 3). However, a father's disability onset does not have an impact on child implication in market work.

Table 1. 2
Effect of parental disability onset on child market and domestic work

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.0895^{+}	3.064*	6.266*	-0.0109	0.0917	-0.567
	(0.0475)	(1.543)	(2.600)	(0.0431)	(0.241)	(1.124)
Disabled Father	0.00893	-0.518	-0.910	-0.0132	-0.260	-0.844
	(0.0424)	(1.487)	(2.783)	(0.0317)	(0.180)	(0.793)
Household Size	-0.00964	0.484	0.803	-0.0230^{+}	-0.0196	-0.223
	(0.0150)	(0.456)	(0.792)	(0.0137)	(0.0528)	(0.211)
Teenager	0.0380	0.255	0.850	-0.0203	0.0928	0.211
	(0.0304)	(0.963)	(1.948)	(0.0286)	(0.109)	(0.405)
Natural Shock	0.0131	-0.509	-0.597	0.0250	0.0603	0.360
	(0.0337)	(1.124)	(1.989)	(0.0292)	(0.148)	(0.426)
Constant	0.648**	6.795*	11.84*	0.872**	1.521**	4.772*
	(0.111)	(3.434)	(5.738)	(0.102)	(0.420)	(1.923)
Observations	3994	3994	1212	3994	3994	464
R^2	0.011	0.005	0.043	0.165	0.040	0.049
Variation a	234 M 366 F	234 M 366 F	76 M 108 F	234 M 366 F	234 M 366 F	35M 50F

H_W= hours dedicated to economic activities; H_C= hours dedicated to chores
Variation a: number of children whose mother (M) or father (F) experiences a disability onset between the two waves.
Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Therefore, contrary to the hypothesis presented in our literature review, an eventual substitutability between parental and child work is not automatic; it depends on the gender of the parent. Our results corroborate those of Alam (2015) who found that only the female parent's disability onset has an effect on child work. In accordance with Diamond and Fayed (1998) or Limat (2010), such results suggest that between the two parents, an eventual substitutability exists only between child and mother market work.

Contrary to the predictions drawn from the existing literature, there is no evidence of an impact of parental disability onset on a child's involvement in chores (column 4 to 6). These results suggest that collecting water or wood are activities generally carried out by children whether their parents are disabled or not[40].

While the fixed effect model relies on the assumption that there is a correlation between μ_i and the explanatory variables, the random effects model assumes that such a correlation does not exist (ie the covariance between μ_i and the explanatory variables is equal to zero). Thus, a random effects model is suitable for our analysis if we are sure that there is no correlation between μ_i and the explanatory variables. When we analyse our sample using a random effects model (Appendix 1.3) we observe that the effect of maternal disability onset on hours worked that was significant when we relied on a fixed effects model become non significant. This result suggests that there is a mis-specification of the model when we rely on a random effects model[41].

In order to check the robustness of our results, we exclude (from our sample) children whose parents were disabled during the two waves; that is, the "control" group is

[40] Results obtained when we exclude children whose parents have difficulties concentrating/remembering (which can be viewed as mental disability; thus we only consider physical disability) are presented in appendixes 1.3 and 1.4 and show that, in general, the conclusion does not change.

[41] We did a Hausman test that leads us to reject the null hypothesis that the unobserved individual fixed effects are uncorrelated with the explanatory variables. The level of significance is 5%.

only composed of children whose parents are "non-disabled" during both waves one and two. We observe that the coefficients associated with hours worked are close to the ones observed in table 1.2 while the coefficient associated with the probability of work increases slightly. Furthermore, there is no statistically significant difference between these coefficients and those observed in table 1.2 (the threshold of the test is 5%). Thus, these results[42] corroborate the conclusions drawn from table 1.2; that is, only a mother's disability onset contributes to an increase in children's labour supply.

We also use an alternative measure[43] of disability. As Alam (2015), we consider that disabled parents are those who have been absent from their usual activities for at least one day due to health issues[44]. Our results, presented in Appendix 1.5 corroborate the finding that only maternal disability onset has an effect on child work. Actually, the coefficient associated with the intensive margin of labour supply are close to the ones obtained in table 1.2 while the coefficient associated with the extensive margin of labour supply is non significant.

Effects on child human capital

When it comes to child human capital, we observe that, contrary to the prediction of the existing literature, parental disability onset does not necessarily hinder child human capital accumulation. In fact, the analysis of the impact of parental health shocks on child human capital reveals that there is no evidence that parental disability onset has an impact on school enrolment (Table 1.3, column 1). This would be because school enrolment is free for students in primary and secondary school in

[42] See Appendix 1.5.

[43] Although we present results obtained with this alternative measure, it is worth noting that in accordance with the Washington Group on Disability Statistics, this measure is not the recommended one when it comes to analysing disability in the context of developing countries. Therefore, in this paper we emphasise the measure of disability presented in the first instance.

[44] The question is: "For how many days were you absent from your usual activity due to the health problem during the last two months?"

Ethiopia[45] or because we do not have enough power with these data to identify a possible impact. In fact, we conducted a power test and found that the minimal size (given the observed means and standard deviations) required to detect a difference in the school enrolment of children with a disabled mother and those with a non-disabled mother is 977 (for each of these two groups). The power of test is 90% and we rely on a 5%-level test. Concerning paternal disability, the minimal size required is 1507 observations per group.

However, we find that the probability of being absent from school or having health issues increases for children whose fathers experience a disability onset while the coefficients associated with mother's disability onset are non significant (columns 2 and 3). In our sample, children whose fathers do not experience a disability onset have a 6pp lower risk of being absent from school than their counterparts. Thus, while in our literature review we predicted that both maternal disability and paternal disability onset would have a negative effect on child education and child health, the results of our regressions reveal that only a father's disability has such a negative impact.

Concerning the impact on health (column 3), our results show that the probability of being exposed to illness is 8pp higher for children whose fathers become disabled. Our results also reveal that children whose household has been exposed to a natural disaster are more likely to miss school[46].

[45] We also used the alternative measure of disability to assess the effect on child human capital, but we got unexpected results. For example, we found that parental disability onset prevents school enrolment. It is difficult to believe that a child will not be enrolled in school (in a context where education is free) because his parent refrained from working for three days (in our data, this corresponds to the average number of days a parent has stopped working due to an illness) for example.

[46] Our conclusion regarding the effect of parental disability onset on child outcomes does not change when we rely on a logit model with fixed effects (Appendixes 1.6 and 1.7).

Table 1. 3
Effect of parental disability onset on child human capital

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	-0.0214	-0.0193	0.0144
	(0.0321)	(0.0370)	(0.0395)
Disabled father	-0.0335	0.0606*	0.0838**
	(0.0250)	(0.0278)	(0.0285)
Household size	-0.000413	0.00423	0.000986
	(0.00814)	(0.00919)	(0.00873)
Teenager	-0.0130	-0.0115	-0.00622
	(0.0176)	(0.0209)	(0.0217)
Natural shock	0.00546	0.0589**	0.0353
	(0.0190)	(0.0209)	(0.0218)
Constant	1.003**	0.130+	0.123+
	(0.0581)	(0.0686)	(0.0658)
Observations	3994	3312	3994
R^2	0.032	0.038	0.013
Variation a	234 M 366 F	186 M 292 F	234 M 366 F

Variation a: number of children whose mother (M) or father (F) experiences a disability onset between the two waves.
Only those who are enrolled in school are asked the question regarding school absence.
Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

An analysis of our sample using a random effects model (Appendix 1.4) shows that, contrary to what we observed with a fixed effects model, paternal disability onset has a negative effect on school enrolment and no effect on school absence. These results suggest that there is a mis-specification of the model when we ignore the presence of any potential endogeneity[47].

In an attempt to test the robustness of our analysis, we retain only children whose parents are non-disabled during both waves as our "control group". Our results[48] show that the coefficients obtained are close to those presented in table 1.3 and confirm the finding that only a father's disability onset affects children's human capital accumulation. Moreover, no effect is observed on school enrolment whatever the gender of the parent.

As stated above, the fixed effects method has some drawbacks.[49] However, we can at least discuss the direction of the bias introduced by endogeneity (Wooldridge, 2010; Greene, 2012). If parental disability status is measured with error there is an underestimation of the effect of parental disability (*D*) on child outcomes except for school enrolment (table 1.4, row 1).

Regarding the other source of endogeneity, suppose the omitted variable is the intertemporal-discount rate (*IDR*). If this latter factor was observable and our model included no control variables aside from our measure of disability, the regression model would have been:

$$Child\ Outcome = \beta_a + \beta_b\ D + \beta_c\ IDR + Error$$

[47] We did a Hausman test that confirms that the fixed effects model is more appropriated for our analysis than the random effects model. The level of significance is 5%.
[48] Appendix 1.5.
[49] We also used an instrumental variable method; here, in accordance with Mont and Nguyen (2013), a parent's disability status is instrumented by his age and the prevalence of disability at the district level. Results do not show any evidence of the impact of parental disability on child outcomes (Appendixes 1.8 and 1.9); however it is worth noting, as highlighted previously, that the validity of the instruments used is questionable.

Since we did not include *IDR* in our model, the value of $\hat{\beta}_b$in tables 1.2 and 1.3 has the form:

$$E(\hat{\beta}_b) = \beta_b + \beta_c * [cov(D, IDR)/var(D)]$$

The direction of the bias depends on the signs of β_c and $cov(D, IDR)$. Since parents with high intertemporal-discount rate are less likely to invest in their children, we expect β_c to be positive for all child outcomes except school enrolment. $cov(D, IDR)$ will be positive as well since parents with a high intertemporal-discount rate may have health-damaging habits making them more likely to suffer from a disability. That being said, the value of $\hat{\beta}_b$ in tables 1.2 and 1.3 overstates the effect of parental disability onset on all child outcomes except school enrolment if *IDR* is the omitted variable. However, since in our regression controls are included, we are not able to identify the direction of the bias (table 1.4, row 2).

To summarize, the direction of the final bias introduced by measurement errors and the omitted variable is unknown.

Table 1. 4
Direction of the bias

			School		
		Work	Enrolment	Absence	Health Issues
	Bias due to:				
(1)	Measurement Error	_	+	_	_
(2)	Omitted Variable (IDR)	Unknown	Unknown	Unknown	Unknown
(3)	Total	Unknown	Unknown	Unknown	Unknown

Source: Author

1.5.3. Channels

An attempt at exploring the mechanisms of the effect of paternal disability onset on health and school absence leads us to evaluate the potential role of household material insecurity (measured by food insecurity[50] experienced by the household) in the relationships observed[51]. As shown in the first column of table 1.5, living in a food insecure household seems to increase the likelihood of a child being ill by 5pp. However, when parental disability status is included in the regression (column 2), the effect of material insecurity decreases (4pp) and becomes less significant (from 5 to 10%). Moreover, further analysis reveals that the difference, between the coefficients associated with material insecurity in columns 1 and 2, is statistically significant at 5%. Furthermore, the effect of paternal disability onset remains robust. These results corroborate the conclusion of Kebede (2005) who found that in rural Ethiopia, material welfare is not the transmission mechanism between household heads' health and their children's health. According to his finding, the intergenerational transmission of health is explained by genetic endowments.

Results regarding school absence are presented in the third and fourth columns. Column 3 shows that material insecurity increases by 8pp the risk of school absenteeism. When we control for parental disability status (column 4), we observe that the effect of material insecurity remains robust, while the effect of paternal disability onset is only significant at 10%. Moreover, there is no statistically significant difference between the coefficients associated with material insecurity in columns 3 and 4. Such a finding suggests that material insecurity is the main channel (or one of the channels through which paternal disability onset affects school absence).

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[50] A household is exposed to food insecurity if its answer is "yes" following this question: "In the past 7 days, did you worry that your household would not have enough food?"

[51] It is worth noting that the variable "material insecurity" may be endogeneous and in such case, coefficients estimated in table table 1.5 would be biased.

An attempt to explore the effect of parental disability onset on household material welfare (column 5) reveals that only a father's disability onset determines household material welfare. That is, living with a father who experiences a disability onset increases by 7pp the risk of a child living in a household exposed to material insecurity. This result is not surprising since fathers are generally the main bread-winner in Ethiopian households (Kifetew, 2006) and disability may prevent them from playing this role. That being said, it is apparent from our analysis that, contrary to the hypothesis drawn from the existing literature, material resources is not the only channel through which parental disability onset affects child human capital accumulation.

Table 1. 5
Channels of the paternal effects

	(1)	(2)	(3)	(4)	(5)
	Health issues		School absence		Material insecurity
Material Insecurity	0.0488*	0.0420+	0.0794**	0.0769**	
	(0.0246)	(0.0245)	(0.0263)	(0.0262)	
Disabled mother		0.0201		0.00204	0.0195
		(0.0389)		(0.0382)	(0.0504)
Disabled father		0.0844**		0.0521+	0.0729*
		(0.0281)		(0.0284)	(0.0368)
Constant	0.150**	0.132**	0.173**	0.163**	0.147**
	(0.0170)	(0.0175)	(0.0167)	(0.0181)	(0.0238)
Observations	3990	3990	3304	3304	3990
R^2	0.006	0.014	0.036	0.039	0.008

The variable "Material insecurity" is coded 1 is the household is food insecure and 0 otherwise. Child fixed effects estimations. Time fixed effects are included in the regressions. Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters. Analysis is done using a fixed-effect OLS model. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

In order to deepen our study and have a better understanding of the mechanisms involved, we disaggregate our initial sample by creating a subsample composed only of girls and another one composed only of boys. Results are presented in the sub-section below.

1.5.4. Sex disaggregation

In this sub-section, we firstly analyse the effect of parental disability onset on boys and girls' activities. Results (Tables 1.6 and 1.7) reveal that paternal disability onset has no impact on children's economic activities and this is contrary to the predictions drawn from the existing literature, since we did not expect paternal disability to affect children's domestic activities. Available data do not allow us to explain why a father's disability onset reduces the time dedicated by boys to domestic activities. However, maternal disability onset has a positive effect on boys' economic activities. That is, it increases the probability of a boy working, and the time spent in the labour market. These results suggest that the substitutability between parental and child work not only depends on the gender of the affected parent, but also on the gender of the child considered. This brings us to the division of tasks between girls and boys in the Ethiopian context. Since girls are primarily involved in domestic tasks while boys are more farming-oriented (Heissler and Porter, 2013), following maternal disability onset, sons will be more likely to substitute for their mother's economic activity. Fathers' economic activities are probably too difficult to be carried out by children[52].

[52] Note that more than 70% of the children in our sample are below 13 years old.

Table 1. 6
Consequence of parental disability onset on girls' activities

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.0523	1.592	7.472	0.0155	0.103	-0.530
	(0.0672)	(1.999)	(4.688)	(0.0653)	(0.396)	(1.647)
Disabled father	0.0366	0.172	1.128	0.00275	-0.117	-0.683
	(0.0559)	(1.772)	(5.162)	(0.0443)	(0.230)	(1.247)
Household size	-0.0175	0.308	0.363	-0.0190	0.0352	-0.132
	(0.0198)	(0.629)	(1.451)	(0.0205)	(0.0640)	(0.295)
Teenager	0.0527	1.407	1.909	-0.0836^{+}	0.00102	0.0553
	(0.0469)	(1.461)	(3.969)	(0.0435)	(0.125)	(0.466)
Natural shock	0.0447	-0.864	-6.261	-0.0535	-0.120	-0.216
	(0.0485)	(1.328)	(3.785)	(0.0407)	(0.212)	(0.400)
Constant	0.651**	7.070	14.42	1.028**	1.357**	4.073
	(0.146)	(4.685)	(10.36)	(0.152)	(0.496)	(2.694)
Observations	1906	1906	374	1906	1906	312
R^2	0.022	0.003	0.055	0.224	0.057	0.035
Variation a	M115 F186	M115 F186	M20 F38	M115 F186	M115 F186	M22 F29

H_W= hours dedicated to economic activites; H_C= hours dedicated to chores.Variation a: number of children whose mother (M) or father (F) experiences a disability onset between the two waves. Child fixed effects estimations. Time fixed effects are included in the regressions. Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$. Source: Author's calculations based on data from ESS.

Table 1. 7
Effect of parental disability onset on boys' activities

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.130*	4.737*	6.257*	-0.0231	0.0947	-0.641
	(0.0581)	(2.165)	(3.099)	(0.0525)	(0.222)	(0.674)
Disabled father	-0.0192	-1.208	-1.797	-0.0302	-0.418+	-1.025*
	(0.0568)	(2.156)	(2.869)	(0.0427)	(0.230)	(0.500)
Household size	-0.00310	0.616	0.852	-0.0280	-0.0723	-0.502
	(0.0204)	(0.636)	(0.884)	(0.0175)	(0.0805)	(0.318)
Teenager	0.0237	-0.873	0.254	0.0241	0.153	0.440
	(0.0426)	(1.344)	(2.248)	(0.0372)	(0.168)	(0.774)
Natural shock	-0.00843	0.0423	1.676	0.0997*	0.225	1.502
	(0.0424)	(1.640)	(2.244)	(0.0401)	(0.182)	(0.905)
Constant	0.649**	6.599	11.41+	0.731**	1.678**	6.771*
	(0.150)	(4.755)	(6.393)	(0.127)	(0.645)	(2.583)
Observations	2088	2088	838	2088	2088	152
R^2	0.007	0.013	0.050	0.126	0.033	0.118
Variation a	M119 F180	M119 F180	M56 F70	M119 F180	M119 F180	M13 F21

H_W= hours dedicated to economic activities; H_C= hours dedicated to chores
Variation a: number of children whose mother (M) or father (F) experiences a disability onset between the two waves.
Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

It would have been interesting to see how maternal disability onset affects their daughters' domestic activities[53] as a whole (cleaning, childcare, cooking, etc.); unfortunately, our database does not provide broader information regarding household chores.

Results regarding human capital are presented in Tables 1.8 and 1.9 below. Our findings reveal that maternal disability onset does not determine our three outcomes of interest, whatever the gender of the child considered. However, when it comes to paternal disability onset, we observe that girls represent the most penalised group. In fact, daughters of disabled fathers are more likely to miss school (8pp) and to have health issues (10pp) compared to their peers (that is daughters whose fathers are not disabled).

When we consider the sample of boys, we observe that sons whose fathers become disabled are more exposed to health issues (6pp) than their counterparts; nevertheless, the coefficient in this case is only significant at the10% level. Further analysis (Appendix 1.10) shows that the more time dedicated by boys to economic activities, the greater their chances of missing classes.

[53] Wood and water collection are not sufficient to represent domestic activities.

Table 1. 8
Effect of parental disability onset on girls' human capital

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	0.00990	-0.0510	-0.00142
	(0.0427)	(0.0444)	(0.0464)
Disabled father	-0.0435	0.0797*	0.102**
	(0.0295)	(0.0365)	(0.0376)
Household size	0.00149	0.00663	0.0148
	(0.00959)	(0.0137)	(0.0123)
Teenager	-0.0169	-0.0530	-0.0459
	(0.0250)	(0.0326)	(0.0310)
Natural shock	0.0162	0.0483	0.0328
	(0.0262)	(0.0297)	(0.0297)
Constant	1.012**	0.118	-0.00327
	(0.0697)	(0.101)	(0.0957)
Observations	1906	1634	1906
R^2	0.039	0.038	0.016
Variation a	M115 F186	M95 F153	M115 F186

Variation a: number of children whose mother (M) or father (F) experiences a disability onset between the two waves.
Only those who are enrolled in school are asked the question regarding school absence. Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Table 1. 9
Effect of parental disability onset on boys' human capital

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	-0.0511	0.0105	0.0215
	(0.0403)	(0.0512)	(0.0554)
Disabled father	-0.0253	0.0420	0.0648^{+}
	(0.0341)	(0.0360)	(0.0392)
Household size	-0.00213	0.00246	-0.0109
	(0.0120)	(0.0106)	(0.0116)
Teenager	-0.00866	0.0248	0.0288
	(0.0253)	(0.0276)	(0.0300)
Natural shock	-0.00383	0.0660**	0.0334
	(0.0248)	(0.0239)	(0.0294)
Constant	0.997**	0.137^{+}	0.235**
	(0.0851)	(0.0800)	(0.0851)
Observations	2088	1678	2088
R^2	0.028	0.045	0.021
Variation a	M119 F180	M91 F139	M119 F180

Variation a: number of children whose mother (M) or father (F) experiences a disability onset between the two waves.
Only those who are enrolled in school are asked the question regarding school absence. Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

It is apparent from our analysis that parental disability onset influences child human capital. Regarding child health, results suggest that sons' health is more valued than daughters' health when the father becomes disabled. This result may be explained by the fact that when the main bread-winner become disabled, households expect boys to provide for their material needs in the future. That being said, when it comes to health related behaviour[54], parents are more likely to favour boys (Garg and Morduch, 1998; Barcellos *et al.*, 2014).

Results concerning school absenteeism suggest once again that sons are favoured compared to daughters. Girls' absenteeism might be explained by an increase in the time dedicated to domestic activities; as stated above, information about domestic activities is very limited and does not allow us to verify our assumption.

To summarize our results, parental disability onset influences child outcomes and the effect depends on the gender of the disabled parent. A father's disability onset compromises the child's human capital accumulation while a mother's disability onset exposes children to child labour. Further analysis reveals that sons are favoured compared to daughters when it comes to human capital investment[55].

1.6. CONCLUSION

The inclusion of disability in the Sustainable Development Goals marks a historic turning point in the lives of people with disabilities who were not explicitly mentioned in the Millennium Development Goals (UN, 2014). People living with disabilities are more likely than their non-disabled peers to face socioeconomic disadvantages that may affect their wellbeing as well as their children's lives. The goal of our paper is to investigate the trade-off between parental disability onset and three domains of children's lives: labour, education and health. We use Ethiopian panel data for our analysis and our sample consists of children aged between 7 and 17

[54] Since material welfare does not appear to be the channel through which parental disability affects child health.
[55] Our results are disability specific.

years old. In order to control for individual unobservable heterogeneity and time specific effects, we use a fixed effects model. Our results show that the impact of parental disability onset on child outcomes depends on the gender of the parent. While a mother's disability onset increases the probability of a child being involved in economic activities, a father's disability onset represents a barrier to child human capital accumulation. Disaggregation by gender reveals that, compared to boys, girls' human capital is more hindered by a father's disability onset[56]. Furthermore, there is evidence that material welfare is the conduit of influence of paternal disability onset on child education. Some recommendations can be drawn, from our work, for policy makers. Firstly, policies addressing the situation of children living with disabled parents need to be paid due attention in Ethiopia. Further research needs to be conducted in order to verify, for instance, if women empowerment might eliminate the negative effect of fathers' disability onset on child human capital accumulation. Secondly, the ideal disability measurement comes from medical assessment which is costly. Failing the affordability of such a measurement, the Washington Group's questions need to be supplemented with questions that can help to differentiate permanent disability from temporary disability. For example, individuals can be asked if their functional limitation is permanent or temporary.

[56] The difference between the coefficients of boys and girls is statistically significant at 5%.

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APPENDIX

Appendixes 1.1 to 1.10 are presented below.

Appendix 1.1
Number of children living with a disabled father by disability type

	(1)	(2)	(3)	(4)	(5)	(6)
	Seeing	Hearing	Walking	Remembering	Self-care	Communication
No difficulty	101	251	252	278	303	322
	(31.08)	(77.23)	(77.54)	(85.54)	(93.23)	(99.08)
Some difficulties	201	71	45	44	18	3
	(61.85)	(21.85)	(13.85)	(13.54)	(5.538)	(0.923)
A lot of difficulties	20	3	20	3	2	0
	(6.154)	(0.923)	(6.154)	(0.923)	(0.615)	0
Unable	3	0	8	0	2	0
	(0.923)	0	(2.462)	0	(0.615)	0
Total	325	325	325	325	325	325
	(100)	(100)	(100)	(100)	(100)	(100)
Observations	325	325	325	325	325	325

Proportions in parentheses; Figures based on the first wave of the panel data.
Source: Author's calculations based on data from ESS.

Appendix 1.2
Number of children living with a disabled mother by disability type

	(1)	(2)	(3)	(4)	(5)	(6)
	Seeing	Hearing	Walking	Remembering	Self-care	Communication
No difficulty	69	142	147	165	170	185
	(36.90)	(75.94)	(78.61)	(88.24)	(90.91)	(98.93)
Some difficulties	111	40	33	22	17	2
	(59.36)	(21.39)	(17.65)	(11.76)	(9.091)	(1.070)
A lot of difficulties	7	5	7	0	0	0
	(3.743)	(2.674)	(3.743)	0	0	0
Total	187	187	187	187	187	187
	(100)	(100)	(100)	(100)	(100)	(100)
Observations	187	187	187	187	187	187

Proportions in parentheses; Figures based on the first wave of the panel data.
Source: Author's calculations based on data from ESS.

Appendix 1.3

Effect of parental disability onset on child activities (Mental disability excluded)
Fixed effect model

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.0883^{+}	3.002^{+}	6.133*	-0.00760	0.109	-0.567
	(0.0483)	(1.568)	(2.667)	(0.0435)	(0.247)	(1.124)
Disabled father	0.0106	-0.502	-0.751	-0.0120	-0.256	-0.844
	(0.0421)	(1.485)	(2.807)	(0.0319)	(0.182)	(0.793)
Household size	-0.0101	0.471	0.799	-0.0238^{+}	-0.0208	-0.223
	(0.0150)	(0.459)	(0.812)	(0.0138)	(0.0532)	(0.211)
Teenager	0.0352	0.208	0.846	-0.0202	0.0955	0.211
	(0.0304)	(0.964)	(1.952)	(0.0287)	(0.109)	(0.405)
Natural shock	0.0155	-0.496	-0.643	0.0249	0.0587	0.360
	(0.0337)	(1.127)	(2.000)	(0.0293)	(0.149)	(0.426)
Constant	0.650**	6.833*	11.78*	0.878**	1.533**	4.772*
	(0.112)	(3.456)	(5.852)	(0.103)	(0.423)	(1.923)
Observations	3974	3974	1204	3974	3974	464
R^2	0.011	0.004	0.043	0.166	0.040	0.049

H_W= hours dedicated to economic activites; H_C= hours dedicated to chores
Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Effect of parental disability onset on child activities
Random effects model

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.0595^{+}	1.748	1.102	-0.00446	0.0197	-0.144
	(0.0348)	(1.150)	(1.830)	(0.0304)	(0.134)	(0.471)
Disabled father	0.0129	-0.228	-0.837	-0.0240	-0.0517	0.216
	(0.0285)	(0.998)	(1.761)	(0.0229)	(0.111)	(0.373)
Household size	-0.0214**	-0.564**	-0.325	-0.0122**	-0.0130	0.0619
	(0.00524)	(0.166)	(0.313)	(0.00442)	(0.0160)	(0.0925)
Teenager	0.0450**	0.911^{+}	0.226	0.0416**	0.178*	0.0386
	(0.0167)	(0.549)	(1.050)	(0.0149)	(0.0741)	(0.284)
Natural shock	0.0410^{+}	1.096	0.796	0.0698**	0.314**	0.531
	(0.0235)	(0.841)	(1.519)	(0.0210)	(0.108)	(0.436)
Constant	0.726**	13.86**	20.15**	0.780**	1.366**	2.393**
	(0.0466)	(1.447)	(2.630)	(0.0406)	(0.163)	(0.709)
Observations	3994	3994	1212	3994	3994	464

Robust standard errors in parentheses
Source: Author's calculations based on data from ESS.

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Appendix 1.4
Effect of parental disability onset on child human capital (Mental disability excluded)
Fixed effects model

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	-0.0178	0.0110	0.0184
	(0.0314)	(0.0387)	(0.0399)
Disabled father	-0.0348	0.0504^{+}	0.0868**
	(0.0244)	(0.0283)	(0.0283)
Household size	0.000735	0.00450	0.00118
	(0.00771)	(0.00919)	(0.00880)
Teenager	-0.0129	-0.00944	-0.00865
	(0.0176)	(0.0209)	(0.0217)
Natural shock	0.00496	0.0609**	0.0362^{+}
	(0.0190)	(0.0209)	(0.0219)
Constant	0.995**	0.126^{+}	0.122^{+}
	(0.0555)	(0.0689)	(0.0664)
Observations	3974	3296	3974
R^2	0.032	0.038	0.014

Only those who are enrolled in school are asked the question regarding school absence. Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Effect of parental disability onset on child human capital
Random effects model

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	-0.0287	0.00850	0.0167
	(0.0234)	(0.0249)	(0.0274)
Disabled father	-0.0397*	0.0313	0.0566**
	(0.0178)	(0.0203)	(0.0188)
Household size	-0.00362	0.000614	-0.00493
	(0.00331)	(0.00364)	(0.00313)
Urban area	0.0382**	-0.0542**	-0.00476
	(0.0145)	(0.0122)	(0.0198)
Teenager	-0.0940**	-0.00647	-0.000717
	(0.0102)	(0.00957)	(0.0105)
Natural shock	-0.00556	0.0430*	0.0279
	(0.0151)	(0.0174)	(0.0191)
Constant	1.002**	0.162**	0.216**
	(0.0332)	(0.0380)	(0.0404)
Observations	3994	3312	3994

Robust tandard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Appendix 1.5

Effect of parental disability onset on child activities (children of parents who are disabled in both waves 1 and 2 are excluded from the analysis)

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.110*	3.426*	6.486*	-0.0176	-0.0745	-1.215
	(0.0510)	(1.673)	(2.890)	(0.0469)	(0.229)	(1.151)
Disabled father	0.0126	-0.847	-2.168	-0.00355	-0.222	-0.684
	(0.0445)	(1.525)	(3.017)	(0.0329)	(0.187)	(0.818)
Household size	-0.00598	0.603	0.867	-0.0219	-0.0315	-0.241
	(0.0156)	(0.477)	(0.846)	(0.0146)	(0.0557)	(0.228)
Teenager	0.0462	0.253	0.469	-0.0295	0.0205	0.165
	(0.0316)	(0.999)	(1.991)	(0.0298)	(0.102)	(0.399)
Natural shock	0.0104	-0.920	-1.231	0.0210	0.107	0.385
	(0.0351)	(1.175)	(2.072)	(0.0304)	(0.147)	(0.439)
Constant	0.617**	5.975+	11.92+	0.856**	1.568**	4.851*
	(0.116)	(3.594)	(6.104)	(0.109)	(0.447)	(2.036)
Observations	3714	3714	1102	3714	3714	440
R^2	0.012	0.006	0.046	0.157	0.038	0.055

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Effect of parental disability onset on child human capital (children of parents who are disabled in both waves 1 and 2 are excluded from the analysis)

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	-0.0270	-0.0244	-0.00448
	(0.0333)	(0.0394)	(0.0409)
Disabled father	-0.0229	0.0578*	0.0892**
	(0.0244)	(0.0285)	(0.0298)
Household size	0.00580	0.00474	0.00237
	(0.00790)	(0.00966)	(0.00915)
Teenager	-0.00265	-0.00982	-0.00321
	(0.0177)	(0.0218)	(0.0223)
Natural shock	-0.00401	0.0589**	0.0312
	(0.0188)	(0.0213)	(0.0229)
Constant	0.965**	0.125+	0.118+
	(0.0576)	(0.0724)	(0.0690)
Observations	3730	3112	3730
R^2	0.034	0.036	0.013

Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Effect of parental disability onset on child activities (alternative measure of disability)

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.0359	2.998**	6.028**	-0.0157	0.0428	0.205
	(0.0352)	(1.088)	(1.908)	(0.0267)	(0.146)	(0.341)
Disabled father	-0.0488	-0.0455	2.012	-0.0159	-0.0510	-0.0946
	(0.0333)	(0.997)	(1.670)	(0.0265)	(0.133)	(0.664)
Household size	-0.00968	0.424	0.514	-0.0222	-0.0210	-0.243
	(0.0151)	(0.460)	(0.810)	(0.0138)	(0.0535)	(0.232)
Teenager	0.0400	0.162	0.470	-0.0149	0.103	0.239
	(0.0307)	(0.969)	(1.955)	(0.0287)	(0.111)	(0.439)
Natural shock	0.0209	-0.422	-1.049	0.0251	0.0500	0.310
	(0.0341)	(1.138)	(2.071)	(0.0295)	(0.153)	(0.437)
Constant	0.659**	6.560+	12.53*	0.872**	1.498**	4.606*
	(0.112)	(3.489)	(6.020)	(0.102)	(0.405)	(1.990)
Observations	3972	3972	1192	3972	3972	460
R^2	0.011	0.008	0.064	0.169	0.038	0.035

Disabled parents are those who have been absent from their usual activities for at least one day due to health issues.
H_W= hours dedicated to economic activites; H_C= hours dedicated to chores
Child fixed effects estimations. Time fixed effects are included in the regressions.
Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Appendix 1.6
Effect of parental disability onset on child activities (Logit with fixed-effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled mother	0.531*	3.064*	6.266*	0.110	0.0917	-0.567
	(0.230)	(1.393)	(2.662)	(0.281)	(0.174)	(0.700)
Disabled father	0.0335	-0.518	-0.910	-0.0679	-0.260+	-0.844
	(0.166)	(1.115)	(2.243)	(0.229)	(0.139)	(0.582)
Household size	-0.0565	0.484	0.803	-0.0593	-0.0196	-0.223
	(0.0606)	(0.398)	(0.799)	(0.0765)	(0.0497)	(0.263)
Teenager	0.178	0.255	0.850	-0.0289	0.0928	0.211
	(0.156)	(1.014)	(1.988)	(0.199)	(0.127)	(0.606)
Natural shock	0.0614	-0.509	-0.597	0.114	0.0603	0.360
	(0.146)	(0.920)	(1.705)	(0.177)	(0.115)	(0.464)
Constant		6.795*	11.84*		1.521**	4.772*
		(2.928)	(5.709)		(0.366)	(1.905)
Observations	1668	3994	1212	1642	3994	464
R^2		0.005	0.043		0.040	0.049

H_W= hours dedicated to economic activities; H_C= hours dedicated to chores. LR chi2 for columns 1 and 4 are respectively 24.24 and 352.67.
Child fixed effects estimations. Time fixed effects are included in the regressions.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Appendix 1.7
Effect of parental disability onset on child human capital (Logit with fixed-effects)

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled mother	-0.229	-0.208	0.285
	(0.418)	(0.398)	(0.293)
Disabled father	-0.479	1.007**	0.839**
	(0.324)	(0.383)	(0.254)
Household size	-0.0541	0.0124	0.0259
	(0.119)	(0.141)	(0.100)
Teenager	-0.282	0.186	-0.155
	(0.329)	(0.315)	(0.240)
Natural shock	0.0161	1.386**	0.412+
	(0.274)	(0.363)	(0.213)
Observations	526	508	782
LR Chi2	64.49	75.01	27.06

Only those who are enrolled in school are asked the question regarding school absence. Child fixed effects estimations. Time fixed effects are included in the regressions. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Appendix 1.8
Effect of parental disability onset on child activities (Two-Stages Least-Squares)

First Stage: Effect of instruments on parental disability

	(1)	(2)
	Men	Women
Father's age	-0.00280	
	(0.00239)	
Prevalence	2.476**	1.721**
	(0.325)	(0.260)
Mother's age		-0.00474*
		(0.00196)
Constant	0.0704	0.118
	(0.115)	(0.0766)
Observations	3992	3994

Standard errors in parentheses. Child fixed effects estimations.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

F-statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
F Statistic	0.505	0.505	0.589	0.505	0.505	0.421

Source: Author's calculations based on data from ESS.

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
F Statistic	0.505	2.086	0.505

Source: Author's calculations based on data from ESS.

Second Stage: Effect of parental disability onset on child activities

	(1)	(2)	(3)	(4)	(5)	(6)
	Work	H_W (H≥0)	H_W (H>0)	Chore	H_C (H≥0)	H_C (H>0)
Disabled father	1.867	52.18	5.166	0.594	0.329	2.184
	(1.826)	(54.10)	(37.28)	(1.183)	(4.277)	(8.139)
Disabled mother	-2.439	-70.06	-16.13	-1.469	-3.177	-4.658
	(2.480)	(73.47)	(54.53)	(1.606)	(5.808)	(5.303)
Household size	-0.0227	0.116	0.679	-0.0269	-0.0222	-0.167
	(0.0263)	(0.780)	(0.912)	(0.0171)	(0.0617)	(0.300)
Teenager	0.0647	1.024	1.605	-0.00732	0.117	0.118
	(0.0644)	(1.907)	(3.236)	(0.0417)	(0.151)	(0.684)
Natural shock	-0.0707	-2.873	-0.985	0.00151	0.0496	0.370
	(0.0984)	(2.916)	(2.552)	(0.0638)	(0.231)	(0.603)
Observations	3990	3990	1212	3990	3990	464
R^2	-2.340	-1.926	-0.069	-0.422	-0.131	-0.167

Standard errors in parentheses. Child fixed effects estimations.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Appendix 1.9

Effect of parental disability onset on child human capital (Two-Stages Least-Squares)

	(1)	(2)	(3)
	School enrolment	School absence	Health issues
Disabled father	-0.155	-0.0878	-0.982
	(0.563)	(0.299)	(1.093)
Disabled mother	0.182	0.301	1.403
	(0.765)	(0.428)	(1.484)
Household size	0.000377	0.00635	0.00867
	(0.00813)	(0.00929)	(0.0158)
Teenager	-0.0143	-0.0139	-0.0217
	(0.0199)	(0.0219)	(0.0385)
Natural shock	0.0102	0.0677**	0.0844
	(0.0304)	(0.0256)	(0.0589)
Observations	3990	3310	3990
R^2	-0.011	-0.028	-1.550

Standard errors in parentheses. Child fixed effects estimations.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

Appendix 1.10
Effect of hours worked on school absenteeism

	(1)	(2)
	Girls	Boys
Disabled mother	-0.0215	0.0210
	(0.0473)	(0.0528)
Disabled father	0.0606	0.0438
	(0.0380)	(0.0346)
Hours worked	-0.000108	0.00127*
	(0.000946)	(0.000630)
Household size	0.00749	0.00199
	(0.0136)	(0.0106)
Teenager	-0.0531	0.0254
	(0.0327)	(0.0276)
Natural shock	0.0502+	0.0668**
	(0.0298)	(0.0238)
Constant	0.114	0.126
	(0.102)	(0.0808)
Observations	1634	1678
R^2	0.035	0.051

Standard errors in parentheses. Child fixed effects estimations. Time fixed effects are included in the regressions. Standard errors are in parentheses and are computed after correcting for correlation and heteroskedasticity within household clusters.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from ESS.

DEUXIÈME CHAPITRE -
DISABILITY AND LABOUR SUPPLY IN UGANDA

ABSTRACT

People living with disabilities have long been ignored in the development agenda adopted by the United Nations despite the fact that they form one of the most vulnerable groups in the society. Their inclusion in the Sustainable Development Goals, adopted recently, represents an attempt to reverse such a trend. Disability represents an obstacle for the well being of men and women in general and for their professional life in particular. However, it is noteworthy that studies on the impact of disability on work are markedly scarce in developing countries and this is mainly due to the lack of suitable data. The goal of this paper is to analyse the impact of disability onset on labour supply in Uganda. The analysis is carried out using a fixed-effects model. Results reveal that disability has no effect on the extensive margin of labour supply. However, when we conduct a gender-disaggregated analysis, we find that only men's intensive margin of labour supply is affected by a disability onset.

2.1. INTRODUCTION

A disability refers to any impairment, activity limitation or participation restriction according to the International Classification of Functioning, Disability and Health (WHO, 2011). Therefore, a disabled person is an individual whose daily activities and/or participation in social life are made difficult because of health issues (Doat, 2010). Despite the fact that people living with disabilities (PWDs), who represent 15%[57] of the world's population, form one of the most vulnerable[58] groups in the society, they have not received all the attention they deserve in the development

[57] The prevalence of disability varies from 12% in high-income countries to 18% in low-income countries

[58] Low education, low employment, low income, etc.

agenda (WHO, 2011). None of the eight Millennium Development Goals (2000-2015) alluded to PWDs though 80% of them live in developing countries (Brander, 2012). The inclusion of PWDs in the Sustainable Development Goals (2015-2030) aims to reverse such a trend by giving more visibility to PWDs. In fact, socio-economic development necessarily involves concrete actions in favour of vulnerable segments of the society; therefore it is difficult to achieve it as long as policies and programs ignore PWDs (United Nations, 2009).

According to Banks and Polack (2014), the low labour supply of PWDs in developing countries generates a loss that varies between 474 and 672 billion dollars annually, depending on the country. These losses could be reduced if effective measures were put in place to prevent/treat disability on the one hand, and to promote employment of PWDs who are unemployed/underemployed on the other hand.

Since it is likely to restrict opportunities for men and women in the labour market[59], a disability onset exposes the individual to poverty and social exclusion. However, it is worth noting that unemployed PWDs are composed of two categories of individuals. The first category includes those who are not looking for a job either because their health status prevent them from working or because they have access to non-labour incomes that enable them to meet their needs. The second category is composed of those who are looking for an income-generating activity but have difficulties in accessing the labour market. In this second case the situation may be explained, on the disabled person's side, either by the lack of suitable qualifications/skills required for a given job, or by a lack of financial resources for those who want to set up their own business. On the employer's side, this may be due to several factors: the low productivity of PWDs which may represent a financial loss for the firm[60], the cost of workplace accommodation associated with the hiring of disabled people, discrimination due to prejudices towards PWDs, and the lack of vacant posts that

[59] Difficult access to employment, preponderance of part-time work, preponderance of jobs in the informal sector, low pay, etc.
[60] If they are paid above their marginal productivity.

affects non-disabled people as well (WHO, 2011; Lamichhane, 2015). It is worth noting that, in the sample used for analysis in the present paper, people mainly rely on subsistence agriculture for a living so that an eventual non-participation in the labour market of PWDs is more likely to be due to their health status.

Studies that analyse the relationship between disability and work generally conclude that there is a negative link between disability and labour supply; that is the labour market participation of PWDs is lower compared to their peers. However, we cannot rely on the presence of a negative association between our two variables of interest to deduce that disability affects labour market participation. In fact, there may exist unobservable factors influencing both disability and labour supply, and creating a spurious relationship between the two variables. For example, lazy people can simulate a handicap or exaggerate the severity of an existing disability in order to receive transfers provided by the government, their relatives or their acquaintances. In such a case, measures taken by public authorities to prevent, mitigate or cure disability in order to improve the labour supply of PWDs cannot achieve the targeted results (Currie, 2009). The effectiveness of measures adopted by public authorities following researchers' recommendations therefore depends on the accuracy of the data analysis (Orphanides, Porter, Reifschneider, Tetlow and Finan, 2000; Oh and Shin, 2015). That being said, it is important to take into account unobservable heterogeneity when analysing the impact of disability on labour supply.

An exploration of the existing literature shows that research on the link between disability and work is rare in developing countries, particularly in African countries (Mizunoya and Mitra, 2013); moreover, existing studies do not generally take into account the potential endogeneity issues that may exist in such an analysis and lead to biased results. To the best of our knowledge, the only published study using a methodology that controls for endogeneity using African data is the paper written by Schultz and Tansel (1997). They rely on an instrumental variable method. The criticism of this approach concerns the validity of the instruments used. For example,

Schultz and Tansel (1997) use food prices to instrument disability. These instruments are valid if they are correlated with disability but not with labour market participation. As stressed by Dow, Gertler, Schoeni, Strauss and Thomas (1997), such a condition is rather difficult to fulfill since food prices has an effect on disability status as well as labour supply decisions.

Our research aims to address the problem of endogeneity by applying ordinary least squares estimation on a fixed effects model (see chapter one for details about this methodology, its limits and the reasons we chose it).

Another finding in developing country studies focusing on the link between disability and work concerns the dependent variable used, which is generally the extensive margin of labour supply (to work or not). Such an analysis hides a reality: even when they have the opportunity to be involved in economic activities, PWDs may be constrained to reduce the amount of work done (Jones, 2011) and thus end up with lower earnings. We take this limitation into account in our paper that aims to assess the impact of disability on the extensive as well as the intensive margins of labour supply in Uganda.

Uganda is an East African country that experienced a civil war between the government force and the rebel group called the Lord's Resistance Army (LRA) in the North of the country. The period of turmoil started in 1986 following the overthrow of the Northerner president Tito Okello by the Southerner and current president named Yoweri Museveni. Between 2006 and 2008, several peace talks took place and ended with a cease-fire in September 2008. The armed conflict exacted a heavy toll on the civilian populations; the LRA is accused of atrocities including abductions, rapes, killings and mutilations of adults and children (Adelman and Peterman, 2014). As stated by Mazurana, Marshak, Gordon, Opio, Atim and McEvoy (2016), the Ugandan civil war has caused numerous cases of physical and mental disabilities. Even though the database used for our analysis does not provide us with

the information about the cause of the disability (e.g: war, accident, etc.), it is worth noting that the Northern region presents the highest prevalence of disability in our sample (Appendix 2.1).

We have chosen to use Ugandan data for two reasons. Firstly, it is one of the few sub-Saharan countries that have distinguished themselves with the particular emphasis on the PWDs' rights in general and their professional insertion in particular (Abimanyi-Ochom and Mannan, 2014). Uganda's legislation promotes the employment of disabled people. For example, the *Persons with Disability Act* (2006) provides for a 15% tax cut to private sector employers who recruit at least 10 PWDs for full-time jobs [61] . Furthermore, in order to promote their economic empowerment, the government provides associations of PWDs with funds (Special Grant for Persons with Disabilities) they can use to set up businesses[62]. Despite the measures adopted by policy makers, statistics show that the employment rate of disabled Ugandans remains lower than that of the non-disabled (Murungi, 2011; Abimanyi-Ochom and Mannan, 2014).

According to the most recent statistics, 16% of the Ugandan population, that is about 5.1 million people, suffer from physical or mental disability (Republic of Uganda, 2013a). In addition, 40% of working age PWDs are forced to join the inactive population permanently because of their health status. Disabled people in Uganda are among the most disadvantaged groups and 80% of them are poor and do not have access to a decent[63] work (Abimanyi-Ochom and Mannan, 2014).

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[61] Due to a lack of data, we are not able to control for the role of this *Act* on the labour supply of PWDs.

[62] Since PWDs, in our sample, were not asked if they belong to an association that receives the Special Grant, we are not able to analyse the effect of these grants in this paper.

[63] According to the International Labour Organization, a "decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men". (This information comes from the International Labour Organization website: http://www.ilo.org/global/topics/decent-work/lang--en/index.htm)

It is important here to specify some of the major facts that characterize Uganda. On the one hand, it is a country whose population is predominantly concentrated in rural areas (77%). On the other hand, the labour market is dominated by the agricultural sector (72% of jobs) (Republic of Uganda, 2014).

Secondly, Uganda has been chosen because it possesses a database that contains a disability module. Moreover, this database has a panel structure, which represents an asset if we do not want to ignore endogeneity. Indeed, as stressed by Mizunoya and Mitra (2013), scarcity of databases containing information about disability on the one hand, and having a longitudinal structure on the other hand, limits the quantity and mainly the scientific quality of studies interested in the impact of disability on work in developing countries.

The remainder of this paper is organized as follows: Section 2 presents a literature review. Section 3 introduces the source of data used in this study. Section 4 provides the methodology while Section 5 presents the results of our analysis. Section 6 is dedicated to the conclusion.

2.2. LITERATURE REVIEW

Studies interested in the relationship between disability and work are exposed to an econometric issue, the so-called endogeneity. This is a problem that may bias the results and which has three sources: reverse causality, declaration bias and justification bias (Cai, 2010, Schmitz, 2011).

The complexity of the link between disability and labour market participation can be observed when analysing the sign (positive or negative) as well as the direction of the relationship (reverse causality) between the two variables. We will first analyse the sign of the relationship. On the one hand, a disability can increase the demand for medical goods or services, leading PWDs to increase their hours of work in order to meet their needs. On the other hand, the onset of a disability may constrain people to

leave the labour market, to reduce their hours of work or to occupy positions they do not like (for example if positions they prefer are incompatible with their health conditions).

Secondly, we analyse the direction of the relationship between the two variables. On the one hand, labour provides income required for health investment; therefore, work reduces the chances of being disabled. On the other hand, some working conditions may cause disability. This is a fact observed in developing countries where poverty forces many people to accept jobs whether workplace safety is guaranteed or not (ILO, 2012).

We now move to the second source of endogeneity: the declaration bias. It is associated with the measure of disability that is used. In the existing literature, people are considered as disabled in one of these cases: 1) a medical assessment concludes that they are disabled, 2) they declare that they have health issues that restrict their daily activities in general and/or their economic activities in particular; or 3) they report they have a specific disability that (partially or totally) prevents them from seeing, speaking, hearing, walking etc. Declaration bias is likely to appear when health related information is collected directly from individuals, because of the subjectivity of their declarations, which can be influenced by their socio-economic characteristics and health standards. For example, research conducted by Moesgaard *et al.* (2002) reveals that for the same level of motor disability, men have a lower propensity to declare that they have functional limitations because they have lower health standards compared to women. In the context of developing countries where disability is a source of shame because of the superstitious beliefs it is associated with, people may tend to under-report their disabilities.

Contrary to the declaration bias, the justification bias is always intentional. In the literature, the justification bias refers to the attitude of people who report health problems in order to rationalize their economic inactivity. Individuals who behave in

such a way may be motivated either by the fear of stigmatization or by the desire to receive social benefits. It is worth noting that in developing countries, social benefits are generally non-existent. Furthermore, in countries where they exist, the allowance amount is generally too low to encourage people to leave the labour market just to receive these transfers (Handa and Neitzert, 1999). However, this does not eliminate the risk of justification bias when analysing data from developing countries since people can simulate or overstate a disability in order to receive transfers from relatives or to beg (Kassah, 2008; Mina, 2010). The final bias introduced by the combination of reverse causality, declaration bias and justification bias is unknown (Currie and Madrian, 1997).

A review of the literature reveals that studies concerned with the effect of disability on labour market participation conclude that there is a negative relationship between the two variables. Differences are observed in the measures of disability chosen and the methodology used for data analysis. Research work conducted in the African context is rare. Moreover, studies tend to ignore endogeneity; this is the case in the papers presented below.

Mitra and Sambamoorthi (2008) use a sample of men living in rural India in their study and find that compared to their peers, PWDs have a lower propensity of having a job. Disabled people here are those who have functional limitations (difficulty seeing, hearing, walking, remembering, communicating) as well as those who are limited in their daily life activities (e.g.: self-care, shopping). Trani and Loeb (2012) also rely on functional limitations, similar to that used by Mitra and Sambamoorthi (2008), in their study based on Zambian data. They are concerned with the determinants of employment and conclude that the following are positively associated with employment among disabled people: Having a high level of education, being wealthy and living in rural areas. The coefficients associated to these three variables are non significant when considering non-disabled people. For his part, Zamo (2013) focuses his attention on a sample of Cameroonians. He finds a negative association

between disability (eg: blindness, deafness…) and the probability of working either in the public or the private sector. According to him, the justification bias cannot be a problem in his analysis since PWDs in Cameroon do not receive social benefits. Therefore, he considers disability as an exogenous variable.

Unlike the three works cited above, the study of Mizunoya and Mitra (2013) simultaneously covers several countries. Their analysis based on seven African countries reveals that disability is negatively associated with the probability of having a job. Differences in employment rates between PWDs and non-disabled people are more pronounced among women and are mainly due to unobservable characteristics (by the researcher) such as productivity.

It is worth noting that some of the studies presented above do not allude to the possible endogeneity that may exist in their study (eg Trani and Loeb, 2012), while other mention this econometric issue even if they do not use a methodology likely to solve it (eg Mizunoya and Mitra, 2013). According to Mizunoya and Mitra (2013), many researchers do not use methodologies that take into account endogeneity because of the difficulty of finding longitudinal data and/or valid instruments.

Contrary to the papers presented above, studies described below rely on an approach that controls (at least partially) for endogeneity. Bridges *et al.* (2015) use data collected during a medical intervention in a hospital located in Kampala, the capital of Uganda. The project consists of distributing orthotic equipment to people who suffer from lower-limbs disabilities. They use a fuzzy regression discontinuity design approach, which is an instrumental variable method (Khandker *et al.*, 2010). The variable that reflects the discontinuity (the day the disabled person arrives at the hospital) must be correlated with the probability of receiving the treatment (orthotic equipment) but not with labour supply. They find that people in the "treatment" group are more likely to participate in the labour market than those who have not received the device. A gender-disaggregated analysis reveals that such a conclusion remains

valid only for women. However, coefficients are non significant when they consider the intensive margin of labour supply. Schultz and Tansel (1997) also rely on an instrumental variable approach to conduct their research (Food prices is used as an instrument). They use Ivorian and Ghanaian data and find a negative relationship between the number of hours worked and the number of days an individual was restricted in his usual activities due to health issues.

The other existing papers based on an instrumental variable approach use data collected in developed countries and conclude that disability represents a barrier to employment (e.g.: Campolieti, 2002; Cai, 2009). The instruments used in the literature can be grouped into two categories. The first category contains individual variables (Stern, 1989; Campolieti, 2002) such as specific diseases (e.g. cardiovascular or respiratory conditions). The second category includes community variables (Schultz, 2008, Schultz and Tansel, 1997) such as the accessibility of the health system and the prices of specific products (e.g.: food, cigarettes). The validity of these instruments may be questioned. For example, a drop in goods prices can encourage people to invest in their health; however, it can also contribute to job creation[64]. As pointed out by Currie and Madrian (1999), identification assumptions used in studies that analyse the impact of disability on labour supply are debatable.

Given the difficulty of finding suitable instruments, an alternative adopted by some authors, who have access to cross-sectional data, is to resort to the matching method. The matching method is based on a strong hypothesis: the probability of being disabled depends only on the observable characteristics or unobservable variables not correlated with the outcome of interest. Lechner and Vazquez-Alvarez (2011) apply this method to German data. PWDs here are those who have been diagnosed, by medical personnel, with a degree of disability greater or equal to 30%[65]. The authors

[64] For a typical good, a reduction in price creates an increase in the demand for this good ; this can lead the producers of this good to hire more workers in order to satisfy the additional demand.

[65] That is, the severity of their disability is assessed and if the degree of their disability corresponds to 30% or more, there are considered as disabled. In order to have his disability status assessed, people

find that disability decreases the probability of work and the impact varies according to the degree of disability. However, it is at least three years after the disability onset that the negative effect on the number of hours worked is observed. Following Lechner and Vazquez-Alvarez (2011), Deiana (2013) applies the matching method to data collected in 26 European countries. Disabled people are those who have health issues that limit their daily activities. He concludes that PWDs have a high propensity either to leave the labour market or to move from full-time to part-time jobs. The most important effects are seen in countries such as Romania and Cyprus.

Some authors combine the matching method with a difference in difference approach when panel data are available. The advantage of this methodology, called difference-in-difference propensity score matching (DD-PSM), is that it allows the control of individual fixed effects and time fixed effects. However, one of the problems faced by researchers when using DD-PSM is the reduction in the number of observations following matching, which increases the risk of ending up with small samples. In fact, individuals who cannot be matched are simply excluded from the analysis. Polidano and Vu (2015) use the DD-PSM in their study based on Australian data. Their results reveal that disability (measured by activity restrictions) has a negative effect on the probability of work. Moreover, it increases the risk of relying on social benefits or of belonging to a poor household and these effects persist even three to four years after a disability onset. This methodology is also used by Barnay, Duguet, Le Clainche, Narcy and Videau (2014) in their analysis based on French data. They find that workers of the private sector are more likely than civil servants to lose their jobs following a disability onset.

It transpires from this exploration of the literature that research on the link between disability and labour supply must take into account endogeneity issues that may

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"go through a formal medical procedure conducted by a special independent institution (Versorgungsamt), where he (she) is identified with a particular degree of disability ranging from 1 to 100%, or 0% in the event that a disability status does not apply." Lechner and Vazquez-Alvarez (2011), pp.391.

introduce bias in the results. A solution to this econometric problem is to resort to an instrumental variable approach. However, given the difficulty of finding valid instruments an alternative when panel data are available is to resort to a methodology that takes into account (at least partially) unobservable heterogeneities.

A formal summary of hypothesis drawn from the existing literature is presented in what follows. An individual's utility *U* depends on his consumption of health related good and services *H* and non-health related good and services *C*. A disability shock may increase the amount of *H*, so we can write *H=H(D)*. U is also influenced by unobservable factors *k*. The utility function can thus be written as follows: *U = U (H(D), C, k)* or *U = U (H, C, k)*. The maximisation of this utility function is subject to a time constraint as well as a budget constraint. In fact, for a given individual, the total amount of time available *T* is divided up between economic activities (*L*) and non economic activities (*l*); that is *T=L+l*. Furthermore, the income provided by his economic activities *Lw* (*w* represents the hourly wage) and unearned income *Y* (e.g.: transfers received) is used for his consumption, so that we can write $P_H H + P_C C = Lw + Y$. Here, P_H and P_C correspond to the price of H and C respectively. The combination of these two constraints leads to the following equation: $P_H H + P_C C + wl = wT + Y$. The problem to be solved is:

Max $U(H, C, k)$ subject to $P_H H + P_C C + wl = wT + Y$

The first order conditions are presented in what follows:

$$U_H^{'} = \lambda P_H \text{ and } U_C^{'} = \lambda P_C \Rightarrow \frac{U_H^{'}}{U_C^{'}} = \frac{P_H}{P_C}$$

Labour market participation *L* depends on disability status *D* but also on factors *X* such as education, gender, etc. *L* also depends on unobservable factors *f* such as laziness; that is *L = L (D, X, f)*. *D* can be viewed as a combination of type and severity of disability.

According to the Grossman's pure investment theory (1972), people pay attention to their health only because health is a determinant of its labour supply. In other words, the more an individual experiences a deterioration of its stock of health capital, the higher his probability of reducing hours dedicated to economic activities. That being said, people can be constrained to leave the labour market if they are suffering from a severe disability.

Let D^* be the threshold (of disability) for an individual to be forced to reduce the time spent in the labour market (without leaving the labour market), while D^{**} is the threshold for the individual to be constrained to leave the labour market ($D^* < D^{**}$). It is worth noting that in the context of developing countries characterised by poverty, people refrain from working only if a severe disability forces them to do so.

That being said, disability does not hinder labour market participation if $D < D^*$. If $D \in [D^*, D^{**})$ the person can be involve in the labour market but his disability status forces him to reduce his working hours.

Factors such as marital status, household size and status in the household (head of the household or not) can influence labour supply. Labour supply from people living with a partner is expected to be higher than that of single people because the former generally have more responsibilities than the latter (in fact they are expected to take care of the extended family of both partners). By the same token, household heads have a higher labour supply than other family members. Furthermore, compared to smaller households, larger households need more material resources to make ends meet and hence they have a higher labour supply.

In the context of sub-Saharan countries, agriculture is the main economic activity and it is characterised by a gendered division of tasks. Men are involved in activities such

as field clearing while women are in charge of less demanding activities such as seed sowing. For undemanding/less demanding jobs, the individual may work without being forced to reduce his labour supply even when $D>D^*$. Thus when it comes to less demanding jobs, there is a threshold D^u (with $D^*<D^u$ and $D^u<D^{**}$) that constrains the person to reduce the time dedicated to economic activities and another threshold D^{uu} ($D^{uu}>D^{**}$) that constraints him to leave the labour market. The first hypothesis we aim at testing is that a disability onset reduces the probability for an individual to work. The second hypothesis is that since tasks carried on by women are less demanding, the effect of a disability onset is more pronounced on men than women. Let L denotes labour supply (probability to work or hours worked) while indices F and M denotes female and male respectively. We can write:

$$\frac{\partial L}{\partial D} < 0;\ \left|\frac{\partial L_F}{\partial D_F}\right| < \left|\frac{\partial L_M}{\partial D_M}\right|$$

To summarize, the idea behind these hypotheses is that disability can be associated with two thresholds. The first one may force a PWD to reduce his working hours, while the second one can constrain him to stop working. However, the threshold value or level varies according to the person and the type of work. Following this section dedicated to the literature, we move to the next section where we will describe the source of data used for our analysis.

2.3. SOURCE OF DATA

As stated above, the scarcity of research work which analyses the impact of disability on labour in African countries is mainly due to the lack of data. Information on disability is generally absent from survey questionnaires (Palmer, 2011). Even when disability related information is provided, the lack of panel data makes it difficult to take into account the possible endogeneity. Uganda is an exception because it has a rich panel database that allows us to achieve the objectives of our study.

Data used in this paper come from the first two waves of the Uganda National Panel Survey (2009/2010 and 2010/2011). This survey is conducted in Uganda by the National Bureau of Statistics with the support of the World Bank. The Uganda National Panel Survey consists of four waves, but the last two waves (2011/2012 and 2013/2014) were not taken into consideration in our analysis because they do not contain a disability module. In 2009/2010, a representative sample of 2607 households was surveyed. Households were randomly selected from 322 enumeration areas. The 2010/2011 wave includes 2564 households. Surveys were carried out after the harvest period (World Bank, 2012). People in our sample are between 15 and 59 years old. The lower bound is the minimum age required for labour market participation. The upper bound is set at 59 years because the retirement age in Uganda is 60 (Republic of Uganda, 2013b).

The disability measure used in this paper is the one recommended by the Washington Group on Disability (WGD), which is a part of the United Nations. It is a measure whose ability to produce internationally comparable statistics has been demonstrated (Madans, Loeb and Altman, 2011). Therefore, according to the WGD's suggestion, PWDs in our study are those who declare that they have difficulties with at least one of the following functionalities: seeing, hearing, communicating, walking/climbing stairs, remembering/concentrating, taking care of themselves (feeding, dressing, showering, etc.). It would have been interesting to disaggregate our sample according to the severity and the type of disability while carrying out our analysis; however, the size of our sample is too small to achieve such a goal in the present study. Nevertheless, the decomposition of our sample according to the heterogeneities mentioned above is presented in appendices 2.2 to 2.8.

It is important to highlight that the Washington group measure has some limits (see chapter one for the discussion), however we use them in our analysis because we do not have a better indicator for disability.

In the questionnaire module on economic activity, six categories of workers are distinguished: Working for someone else for pay, employer, own-account worker, helping without pay in a household business, apprentice, working on the household farm or with the household livestock. This last category accounts for 68% of the working population in our sample (Appendix 2.9).

The choice of the controls used in our regressions is inspired by the existing literature. These variables characterise either the individual (household status, marital status) or the household as a whole (household size). Table 2.1 below describes our variables. The methodology used for data analysis is presented in the third section.

Table 2. 1
Variables description

Variables	Definition
Dependent variables	
Work	1 = has a job; 0 = otherwise
Hours worked	Number of hours worked
Explanatory variable	
Disability	1=difficulty seeing, hearing, communicating, walking or climbing stairs, remembering or concentrating, taking care of one's self (feeding, dressing, showering, etc.) 0= otherwise
Controls	
Marital status	1= live with a partner, 0= otherwise
Status in the household	1= household head, 0= otherwise
Household size	Number of people living in the household

Source: Author

2.4. METHODOLOGY

Our strategy consists of running fixed-effects regression using Ordinary Least Squares estimation (see chapter one for details about this methodology and its limits). Consider the following equation that presents the determinants of labour supply:

$$Y_{it} = \alpha + \beta D_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

In the specification presented above, *i* represents a given individual of our sample while t corresponds to the wave of the panel that is considered. Y represents the labour supply. More precisely, it is the probability of working during the seven days preceding the survey if we are interested in the extensive margin of labour supply, and the number of hours worked during this time horizon when we analyse the intensive margin of labour supply. D is a binary variable that takes the value 1 if the individual is disabled and 0 otherwise. α corresponds to the constant, β is the coefficient associated to the explanatory variable while γ represents the vector of coefficients associated with the controls *X*. Controls are: Marital status, status in the household and household size. μ_i corresponds to individual fixed effects. λ_t represent time fixed effects; that is, unobserved factors that vary across time and affect all individuals of a given population (Fougère, 2010). For example, the likelihood of blindness in sub-Saharan Africa due to black fly stings has decreased over time for the entire population following the adoption of measures to eradicate onchocerciasis (WHO, 2007). Similarly, the chances of finding or keeping a job, for all individuals in a country, depend on the economic situation. ε_{it} corresponds to the idiosyncratic error term ie the unobservable characteristics that vary across individual and through time. Results of our estimations are presented in the next section.

2.5. RESULTS

Our descriptive statistics are presented in Table 2.2 below. Our sample is composed of 5,126 observations, 84% of people in our sample are employed and dedicate on average 28 hours/week to the labour market. These statistics correspond respectively to 81% and 26 hours/week during the second wave. People living with a partner are the most represented groups in our sample (56% and 54% respectively). Statistics about the disability status reveal that PWDs represent 13% of our sample in the first wave. In the second wave 24% of people are declared disabled. During the first wave, households are composed of eight members on average and household heads

represent 34% of our sample. These figures correspond respectively to nine and 37% during the second wave.

Table 2. 2
Descriptive Statistics

	Wave 1		Wave 2	
Variable	Mean	Standard deviation	Mean	Standard deviation
Work	84%		81%	
Hours worked[66]	28	23.36	26	21.35
Disabled	13%		24%	
Couple	56%		54%	
Household head	34%		37%	
Household size	8	3.34	9	3.67
Observations	5126		5126	
Variable	Mean	Standard deviation	Mean	Standard deviation
Work	84%		85%	
Hours worked[67]	28	23.36	29	21.35
Disabled	13%		25%	
Couple	56%		52%	
Household head	34%		35%	
Household size	8	3.34	9	3.67
Observations	5126		5126	

Source: Author's calculations based on data from UNPS.

As stated above, the health condition we name "disability" may be a temporary disability due to poor health conditions (see chapter one for details and for the implication of the use of a fixed effects model). Our calculation reveals that 62% of PWDs in our sample have their disability since two years or more. 662 individuals in

[66] This variable is not conditioned on work, that is we include also people who do not work (hours=0) because we are also interested in people whose hours worked change from x hours (x>0) to 0 hours because of a disability onset.
[67] This variable is not conditioned on work, that is we include also people who do not work (hours=0) because we are also interested in people whose hours worked change from x hours (x>0) to 0 hours because of a disability onset.

our sample have known a disability onset between the two waves; that is 283 men and 379 women. Information available in the database does not allow us to identify the causes of this disability onset.

In Table 2.3 below, we present the results of the fixed-effects estimation. When we consider our entire sample, results show that disability onset has no effect on the extensive margin as well as the intensive margin of labour supply (columns 1 and 2). The analysis of gender-disaggregated[68] data reveals that this conclusion remains valid when the sample is only composed of women. Results from the male sample show that hours worked is reduced by 4h/week following the onset of a disability.

According to our hypotheses drawn from the existing literature, results about the extensive margin of labour supply suggest that, in general, the disability status of people in our sample has not reached a threshold (D^{**} for demanding jobs and D^{uu} for less demanding jobs) that constrains them to leave the labour market. These results are not surprising since the majority of PWDs in our sample report a moderate disability. As stated by Erb and Harriss-White (2002), in an agrarian economy, adults refrain from working only in cases of severe disability. Evidence of the non-existence of an effect of disability on the probability of working, regardless of the gender, was also observed in the case of Malawi (Mizunoya and Mitra, 2013).

Concerning labour intensive margins, like Jones, Davies and Drinkwater (2012), we find that disability onset is much more prejudicial to men than to women. This result suggests that, in general, disabled men in our sample have reached the threshold D^{*} that pushes them to reduce their working hours. For their part, women are involved in less demanding jobs/tasks; thus, in general, disabled women in our sample have not reached the threshold D^{u} that forces people involved in this type of jobs/tasks to spend less time on the labour market.

[68] Statistics according to the gender are presented in appendixes 2.10 and 2.11.

Indeed, there is a division of labour between men and women in agriculture, which is the dominant sector in Uganda. According to the literature on the gendered division of tasks in the agricultural sector, men are generally responsible for field clearing and land plowing, while women are generally in charge of seeding or beating out the grain. For example, it would be less practical for a visually impaired person or for someone who has difficulty walking to clear a field than to beating out the grain. That being said, instead of completely refraining from doing their (agricultural) tasks, it may be possible that disabled men tend to reduce their hours of work. Unfortunately, the Uganda National Panel Survey does not provide detailed information about the tasks (e.g: seeding, field clearing, etc.) performed by the workers; such information would have helped us to verify our assumption.

Table 2. 3
Effect of disability onset on labour supply

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	-0.00414	-1.292	-0.00301	0.600	-0.00553	-3.799*
	(0.0124)	(1.080)	(0.0166)	(1.245)	(0.0186)	(1.790)
Couple	0.00798	2.978	-0.0209	4.291	0.0460	1.775
	(0.0464)	(2.868)	(0.0671)	(3.697)	(0.0572)	(4.410)
Household head	0.0427	2.298	0.0702+	3.597	-0.0271	-0.0834
	(0.0302)	(2.295)	(0.0367)	(2.920)	(0.0530)	(4.301)
Household size	-0.00419	-0.468	-0.00290	-1.071+	-0.00611	0.156
	(0.00512)	(0.405)	(0.00715)	(0.562)	(0.00640)	(0.540)
Constant	0.856**	29.38**	0.853**	30.10**	0.894**	29.55**
	(0.0475)	(3.699)	(0.0676)	(4.929)	(0.0651)	(5.327)

N= 5126; that is 2653 women and 2473 men
662 people have known a disability onset between the 2 waves; that is 283 men and 379 women
Standard errors are robust and clusterized at the household level; $^{+}\ p < 0.10$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$
Source: Author's calculations based on data from UNPS.

Controls used in our regression are non significant at 5%. It is important to notice that our results are not comparable to those of Bridges *et al.* (2015) because, unlike us, their sample is composed of individuals suffering from a specific handicap and living in the capital.

An analysis of our sample using a random effects model (Appendix 2.12) shows that, contrary to what we observed with a fixed effects model, disability onset always have a negative effect on the intensive margin of labour supply. A negative effect on the extensive margin of labour supply is only observed for male. These results suggest that we shall take account of any potential endogeneity in our analysis[69]

In order to test the robustness of our analysis, we excluded people who were disabled during both waves from our analysis (so that the "control" group includes only those who do not experience any disability shock in the two waves). We observe that our conclusion remains valid; that is, only hours worked per week by men are reduced by four on average following a disability onset (appendix 2.12).

We also relied on another methodology[70] to analyse our data; that is, we combined PSM[71] with the fixed effects approach (Appendix 2.12) and results show that coefficients associated with our explanatory variable are not significant. It is important to notice that by relying on PSM, we end up with very small samples[72]. However, these results should be taken cautiously and they are not directly

[69] We did a Hausman test that confirms this. The level of significance is 5%.
[70] We also attempted to use an instrumental variable method. The instruments of disability used here are inspired by the study of Mont and Nguyen (2013); that is people's age and the prevalence of disability at the district level. Results (Appendix 2.13) show that these instruments are weakly correlated with the disability status on the one hand, and the disability status does not determine the probability of work or hours worked on the other hand.
[71] Nearest neighbour matching approach (one to one, no replacement).
[72] In fact, this methodology requires that only people from the treated group (non disabled in wave 1 and disabled in wave 2) and the control group (non disabled during the 2 waves) who have similar characteristics are included in the analysis.

comparable with those presented in table 2.3 since the analysis is only based on observations that are in the common support region[73].

In an attempt to go further in our analysis, we use an alternative measure of disability in our fixed-effects model (see results in Appendix 2.14). Here PWDs are those who have to stop their usual activities for at least one day from their usual activities [74] (during the 30 days preceding the interview) because of health issues (Alam, 2015). Results concerning the extensive margin of labour supply corroborate those presented previously. That is, the onset of a disability does not determine the probability for a person to work. Findings concerning the intensive margin of men's labour supply also remain robust. However, contrary to what we observed in table 2.3, we find here that disability onset affects women's working time. We also analyse the effect of these number of days (when people were force to cease their activities) on the labour supply and results show that in general when the number of days increases, the labour supply is affected[75].

Insofar as the Ugandan population is predominantly located in rural areas on the one hand and that work in household farms is dominant, we take our analysis further by evaluating the impact of disability onset on the agricultural labour supply in rural areas (Table 2.4). Indeed, according to our data, 69% of labourers work on household farms and 92% of these agricultural workers live in rural areas.

Our results are presented in table 2.4 below and they show that our conclusion about the effect of disability onset remains robust. Indeed, disability onset affects only the intensive margin of men's labour supply that it reduces by 5h/week. Significant

[73] In the PSM approach, the "common support" refers to the fact that only those of the treated group (non disabled in wave 1 and disabled in wave 2) and the control group (non disabled whatever the wave considered) who have similar observed characteristics are includes in the analysis.
[74] The question is: "For how many days did you have to stop doing your usual activities due to illness or injury during the past 30 days? "
[75] Appendix 2.16 presents results obtained when we consider only those with a physical disability, that is we exclude those who have difficulties remembering or concentrating.

controls are household size and marital status. Regarding household size, when it increases by one member, the number of hours worked per person decreases by one hour per week. This result remains robust even if we split our sample according to gender. Such a result corroborates those of Mugume and Canagarajah (2005). In their analysis of the determinants of labour market participation in Uganda, these authors find that there is a negative impact of household size on members' labour supply. This may be explained by the following fact: For a given cultivable land, large households can benefit from a more abundant workforce and thus hours worked per individual can be reduced.

Regarding marital status, results are mixed. Compared to single individuals, people with a partner spend more time in the labour market. This conclusion is similar to the one presented by Bridges and Lawson (2009) who find that in Uganda, being in a couple has a positive effect on labour supply. This could be explained by the fact that in the African context, married people are given more responsibilities. In addition to taking care of the members of their households, married people generally also have to help relatives who live outside their home. However, the gender-based analysis reveals that marital status only affects women's hours of work. Such a result may suggest that men prepare for their future role as household head, long before they cohabit with their partners, by adopting a labour supply behaviour befitting of the potential main bread-winner.

Regarding the extensive margin of labour supply, we find a negative effect of being married on work when we consider the sample as a whole. This result is counter-intuitive because it seems to indicate that married people, despite the additional burdens they have, are less involved in economic activities than their peers. However, such a result is no longer valid when the sample is decomposed according to gender.

It is apparent from our analysis that in Uganda, the onset of a disability as measured by functional limitations, does not influence the probability of work. Furthermore,

only men experience a drop in hours worked following the onset of a disability; and the reduction is quite low (less than one hour per day). For more than one reason, these findings do not imply that disability is a marginal problem that does not deserve the attention of the Ugandan government. Firstly, a reduction in working time of 4 hours/week[76] may seem negligible, however on an annual basis this represents more than 200 hours of work lost per disabled person. If the latter figure was multiplied by the number of PWDs, the losses incurred at the national level would be large. In fact for the 5.1 million of PWDs in Uganda, the total amount of earnings lost per year is estimated to be 424.320.000$[77]. Secondly, in developing countries, families generally rely on men when it comes to meeting material needs. Thus, by reducing men's working time, disability is likely to expose entire families to material insecurity.

[76] This represents 13% of hours worked per week by those who are involved in economic activities in our sample.

[77] Information about earnings in Uganda, used to estimate the amount of money lost, comes from the Uganda Urban Labour Force Survey of 2015.

Table 2. 4
Effect of disability onset on agricultural labour supply in rural areas

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	0.00780	-0.864	0.00673	1.479	0.00863	-5.247*
	(0.0247)	(1.246)	(0.0293)	(1.377)	(0.0432)	(2.380)
Couple	-0.131*	7.668*	-0.0968	11.25*	-0.167	6.120
	(0.0650)	(3.770)	(0.0892)	(4.374)	(0.106)	(6.548)
Household head	-0.1000+	2.509	-0.109+	4.113	-0.0461	-5.717
	(0.0542)	(2.929)	(0.0656)	(3.304)	(0.141)	(6.237)
Household size	0.00184	-1.349**	0.00577	-1.298*	-0.00190	-1.313*
	(0.0101)	(0.448)	(0.0102)	(0.572)	(0.0159)	(0.628)
Constant	0.886**	28.35**	0.894**	22.85**	0.841**	36.57**
	(0.0928)	(4.350)	(0.110)	(5.613)	(0.157)	(5.657)

N= 2863; that is 1394 women and 1469 men
403 people have known a disability onset between the 2 waves; that is 166 men and 237 women.
Standard errors are robust and clusterized at the household level.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

2.6.CONCLUSION

The analysis of the impact of disability onset on labour supply has been the subject of many research studies in developed countries. However, few studies are centred on this topic in developing countries. Furthermore, existing papers tend to focus on the extensive margin of labour supply. Our study is based on panel data collected in Uganda and its objective is to analyse the impact of disability onset on labour supply.

Uganda was chosen because, on the one hand, it is one of the few countries in sub-Saharan Africa that have distinguished themselves in their willingness to improve the living conditions of PWDs; and, on the other hand, it possesses a database that is suitable for our analysis since it has a panel structure and contains information on disability.

We apply ordinary least squares on a fixed effects model and find that disability onset does not influence the probability of working in Uganda. Furthermore, the analysis of the intensive margin of labour supply shows that only men's hours of work are reduced following a disability onset. Our paper has some limitations however. Firstly, the fixed effects model which has its limits. Secondly, PWDs are put together whatever the type and the severity of their health issues; yet it would have been interesting to conduct an analysis that does not ignore heterogeneity (severity, type of disability) among PWDs if we had a bigger sample of disabled people.

A policy recommendation emerges from our work. A section devoted to disability should not disappear from household surveys (this is the case in the two last surveys conducted in 2011/2012 and 2013/2014) because the absence of statistics on a vulnerable group can only reinforce its invisibility (Abimanyi-Ochom and Mannan, 2014).

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APPENDIX

Appendixes 2.1 to 2.16 are presented below.

Appendix 2.1
Percentage of people by disability status and region (Number in parentheses)

	Disabled		
Region	No	Yes	Total
Central	85.65	14.35	100
	(1241)	(208)	(1449)
Eastern	86.78	13.22	100
	(1109)	(169)	(1278)
Northern	83.71	16.29	100
	(1064)	(207)	(1271)
Western	93.62	6.38	100
	(1056)	(72)	(1128)
Total	87.2	12.8	100
N	(4470)	(656)	(5126)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.2
Percentage of people by severity of disability (Number in parentheses)

Severity	Men	Women	Total
No difficulty	88.60	85.90	87.20
	(2191)	(2279)	(4470)
Some difficulty	8.49	11.80	10.20
	(210)	(313)	(523)
A lot of difficulty	2.22	2.15	2.18
	(55)	(57)	(112)
Unable	0.69	0.15	0.41
	(17)	(4)	(21)
Total	100.00	100.00	100.00
N	(2473)	(2653)	(5126)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.3
Percentage of people by level of difficulty seeing (Number in parentheses)

Seeing	Men	Women	Total
No difficulty	94.78	91.63	93.15
	(2343)	(2431)	(4774)
Some difficulty	4.53	7.76	6.20
	(112)	(206)	(318)
A lot of difficulty	0.61	0.57	0.59
	(15)	(15)	(30)
Unable	0.08	0.04	0.06
	(2)	(1)	(3)
Total	100.00	100.00	100.00
N	(2472)	(2653)	(5125)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.4
Percentage of people by level of difficulty hearing (Number in parentheses)

Hearing	Men	Women	Total
No difficulty	97.49	97.66	97.58
	(2411)	(2590)	(5001)
Some difficulty	1.98	2.11	2.05
	(49)	(56)	(105)
A lot of difficulty	0.36	0.23	0.29
	(9)	(6)	(15)
Unable	0.16	0.00	0.08
	(4)	(0)	(4)
Total	100.00	100.00	100.00
N	(2473)	(2652)	(5125)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.5
Percentage of people by difficulty walking/climbing stairs (Number in parentheses)

Walking	Men	Women	Total
No difficulty	96.56	95.21	95.86
	(2388)	(2525)	(4913)
Some difficulty	2.75	3.77	3.28
	(68)	(100)	(168)
A lot of difficulty	0.57	0.98	0.78
	(14)	(26)	(40)
Unable	0.12	0.04	0.08
	(3)	(1)	(4)
Total	100.00	100.00	100.00
N	(2473)	(2652)	(5125)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.6
Percentage of people by difficulty remembering/concentrating
(Number in parentheses)

Remembering	Men	Women	Total
No difficulty	98.22	97.85	98.03
	(2428)	(2595)	(5023)
Some difficulty	0.81	1.62	1.23
	(20)	(43)	(63)
A lot of difficulty	0.73	0.45	0.59
	(18)	(12)	(30)
Unable	0.24	0.08	0.16
	(6)	(2)	(8)
Total	100.00	100.00	100.00
N	(2472)	(2652)	(5124)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.7
Percentage of people by difficulty taking care of themselves (Number in parentheses)

Self-care	Men	Women	Total
No difficulty	99.07	99.47	99.28
	(2449)	(2638)	(5087)
Some difficulty	0.49	0.38	0.43
	(12)	(10)	(22)
A lot of difficulty	0.32	0.08	0.20
	(8)	(2)	(10)
Unable	0.12	0.08	0.10
	(3)	(2)	(5)
Total	100.00	100.00	100.00
N	(2472)	(2652)	(5124)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.8
Percentage of people by difficulty communicating (Number in parentheses)

	Men	Women	Total
No difficulty	99.03	99.59	99.32
	(2448)	(2640)	(5088)
Some difficulty	0.44	0.26	0.35
	(11)	(7)	(18)
A lot of difficulty	0.32	0.11	0.21
	(8)	(3)	(11)
Unable	0.20	0.04	0.12
	(5)	(1)	(6)
Total	100.00	100.00	100.00
N	(2472)	(2651)	(5123)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.9
Disability by job type (percentage in parentheses)

	Disabled		
Type of job	No	Yes	Total
Wage-earner	419	41	460
	(11.21)	(7.35)	(10.71)
Employer	15	0	15
	(0.4)	(0)	(0.35)
Own account worker	628	132	760
	(16.8)	(23.66)	(17.69)
Household business	101	12	113
	(2.7)	(2.15)	(2.63)
Apprentice	10	3	13
	(0.27)	(0.54)	(0.3)
Household farm	2,564	370	2,934
	(68.61)	(66.31)	(68.31)
Total	3,737	558	4,295
	(100)	(100)	(100)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.10
Percentage of people by disability status

Disabled	Men	Women	Total
No	88.60	85.90	87.20
Yes	11.40	14.10	12.80
Total	100.00	100.00	100.00
N	(2473)	(2653)	(5126)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.11
Percentage of people by disability status and gender

Sex	Not disabled	Disabled	Total
Men	49.02	42.99	48.24
Women	50.98	57.01	51.76
Total	100.00	100.00	100.00
N	(4470)	(656)	(5126)

Statistics based on the first wave
Source: Author's calculations based on data from UNPS.

Appendix 2.12

Effect of a disability onset on labour supply (people who are disabled during both waves are excluded from the sample)

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	-0.00410	-1.301	-0.00310	0.581	-0.00542	-3.795*
	(0.0124)	(1.080)	(0.0166)	(1.247)	(0.0186)	(1.791)
Couple	-0.00661	1.649	-0.0319	3.740	0.0266	0.110
	(0.0491)	(2.921)	(0.0742)	(4.060)	(0.0569)	(4.205)
Household head	0.0348	2.795	0.0628+	4.980	-0.0265	-1.053
	(0.0312)	(2.382)	(0.0376)	(3.065)	(0.0547)	(4.308)
Household size	-0.00308	-0.355	-0.0000117	-0.881	-0.00683	0.171
	(0.00534)	(0.431)	(0.00744)	(0.608)	(0.00660)	(0.559)
Constant	0.860**	29.44**	0.839**	29.12**	0.912**	31.21**
	(0.0499)	(3.837)	(0.0720)	(5.358)	(0.0671)	(5.270)
Observations	9692	7732	4996	3910	4696	3822

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Effect of disability on labour supply (Random effects model)

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	-0.0138	-4.635**	0.000493	-2.218*	-0.0409**	-7.140**
	(0.0103)	(0.736)	(0.0133)	(0.889)	(0.0154)	(1.154)
Couple	0.176**	4.660**	0.218**	4.063**	0.142**	6.799**
	(0.0102)	(0.617)	(0.0142)	(0.848)	(0.0206)	(1.701)
Household head	0.108**	9.369**	0.167**	7.120**	0.109**	7.274**
	(0.00739)	(0.550)	(0.0136)	(0.994)	(0.0203)	(1.708)
Household Size	-0.00128	-0.0794	-0.00173	-0.153	0.000336	-0.108
	(0.00163)	(0.114)	(0.00208)	(0.126)	(0.00192)	(0.166)
Constant	0.718**	22.52**	0.688**	22.63**	0.724**	23.92**
	(0.0164)	(1.059)	(0.0221)	(1.357)	(0.0219)	(1.562)
Observations	10252	8155	5306	4145	4946	4010

Robust standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

Propensity Score Matching Approach

Determinants of disability

	(1)
	Disabled
Couple	0.185*
	(0.0751)
Household head	0.360**
	(0.0656)
Household size	0.00368
	(0.00961)
Constant	-1.802**
	(0.103)
Observations	5126

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Source: Author's calculations based on data from UNPS.

Effect of disability onset on labour supply (Propensity Score Matching Approach)

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	0.0139	2.281	0.0142	1.304	0.0159	2.447
	(0.0273)	(2.430)	(0.0409)	(3.531)	(0.0346)	(3.433)
Couple	0.0802	10.74	0.111	14.13	0.0185	2.532
	(0.126)	(6.745)	(0.0897)	(9.046)	(0.248)	(4.261)
Household head	-0.00581	1.709	-0.000969	3.398	0.00701	-12.90**
	(0.0993)	(7.641)	(0.103)	(8.514)	(0.0344)	(3.152)
Household size	-0.0319*	-0.536	-0.0448*	-1.088	-0.0128	0.188
	(0.0151)	(0.864)	(0.0179)	(1.059)	(0.0233)	(1.418)
Constant	1.017**	31.39**	1.069**	25.33*	0.954**	53.11**
	(0.144)	(9.612)	(0.138)	(11.88)	(0.250)	(10.07)
Observa-tions	582	582	324	324	258	258

Standard errors in parentheses

$^{+}\ p < 0.10$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$

Source: Author's calculations based on data from UNPS.

After the estimation of the determinants of disability (previous table), a propensity score is calculated for each individual, then individuals are matched according to the closeness of their propensity scores (nearest neighbour approach, no replacement). Finally, only those in the common support area are kept for the analysis of the effect of disability on labour supply.

Appendix 2.13
Results of the Two-Stage Least Squares regressions

First Stage: Effect of instruments on the disability

	Dependent variable: disability status		
	(1)	(2)	(3)
	ALL	WOMEN	MEN
Age	-0.00197	-0.00738^{+}	0.00325
	(0.00280)	(0.00421)	(0.00370)
Prevalence	0.125^{+}	0.150	0.0977
	(0.0658)	(0.0962)	(0.0891)
Constant	0.166^{+}	0.350*	-0.00420
	(0.0897)	(0.138)	(0.116)
Observations	5126	2653	2473

Standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

F statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
F-Statistic	1.338	1.607	0.758	1.458	2.240	1.663

Source: Author's calculations based on data from UNPS.

Second Stage: Effect of disability on labour supply

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	-0.532	80.27	-0.0870	13.59	-0.347	40.66
	(0.705)	(57.36)	(0.820)	(32.48)	(0.521)	(46.72)
Couple	-0.00043	2.282	-0.0224	4.559	0.0398	0.366
	(0.0440)	(4.526)	(0.0586)	(3.814)	(0.0546)	(5.067)
Household head	0.0256	5.446	0.0668	4.272	-0.0289	0.259
	(0.0463)	(4.703)	(0.0563)	(3.417)	(0.0652)	(5.621)
Household size	-0.00338	-0.661	-0.00269	-1.145*	-0.00601	0.230
	(0.00480)	(0.553)	(0.00624)	(0.473)	(0.00622)	(0.590)
Observa Tions	5126	5126	2653	2653	2473	2473

Standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

Appendix 2.14
Effect of disability onset on labour supply (alternative measure of disability)
Disability status is a binary variable

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Hours	Work	Hours
Disabled	-0.0129	-3.126**	-0.0117	-2.613**	-0.0147	-3.778**
	(0.00938)	(0.739)	(0.0126)	(0.935)	(0.0138)	(1.162)
Couple	0.00701	2.663	-0.0226	3.841	0.0453	1.601
	(0.0457)	(2.899)	(0.0696)	(3.782)	(0.0519)	(4.367)
Household head	0.0445	2.371	0.0730+	3.974	-0.0278	-0.946
	(0.0311)	(2.344)	(0.0375)	(2.946)	(0.0545)	(4.406)
Household size	-0.00360	-0.492	-0.00267	-1.078+	-0.00504	0.109
	(0.00521)	(0.413)	(0.00732)	(0.574)	(0.00640)	(0.551)
Constant	0.856**	30.39**	0.857**	31.27**	0.891**	30.94**
	(0.0474)	(3.766)	(0.0698)	(5.024)	(0.0630)	(5.420)
Observations	5126	5126	2653	2653	2473	2473

Standard errors in parentheses;
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

Appendix 2.15
Effect of disability onset on labour supply (alternative measure of disability)
Disability status is a continuous variable

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Work	Hours	Work
Number of days	-0.0033**	-0.454**	-0.00128	-0.391**	-0.005**	-0.525**
	(0.00123)	(0.0960)	(0.00183)	(0.105)	(0.00159)	(0.173)
Couple	0.00592	2.632	-0.0232	3.756	0.0425	1.608
	(0.0456)	(2.925)	(0.0698)	(3.831)	(0.0511)	(4.389)
Household head	0.0464	2.487	0.0730+	4.036	-0.0241	-0.670
	(0.0310)	(2.363)	(0.0376)	(2.976)	(0.0535)	(4.420)
Household size	-0.00354	-0.494	-0.00275	-1.086+	-0.00490	0.117
	(0.00521)	(0.414)	(0.00732)	(0.576)	(0.00636)	(0.551)
Constant	0.858**	30.28**	0.856**	31.30**	0.894**	30.58**
	(0.0473)	(3.776)	(0.0699)	(5.042)	(0.0623)	(5.432)
Observations	5126	5126	2653	2653	2473	2473

Standard errors in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

Appendix 2.16
Effect of disability onset on labour supply (mental disability excluded)

	(1)	(2)	(3)	(4)	(5)	(6)
	ALL		WOMEN		MEN	
	Work	Hours	Work	Work	Hours	Work
Disabled	0.00310	-1.023	-0.00124	0.836	0.00910	-3.509^{+}
	(0.0125)	(1.163)	(0.0175)	(1.306)	(0.0173)	(1.952)
Couple	-0.0141	3.362	-0.0209	5.195	0.00555	1.790
	(0.0407)	(2.885)	(0.0686)	(3.711)	(0.0434)	(4.414)
Household head	0.0421	2.437	0.0735^{+}	3.928	-0.0243	-0.126
	(0.0310)	(2.342)	(0.0383)	(3.015)	(0.0533)	(4.292)
Household size	-0.00404	-0.472	-0.00176	-1.106^{+}	-0.00681	0.163
	(0.00532)	(0.420)	(0.00754)	(0.584)	(0.00639)	(0.552)
Constant	0.870**	29.21**	0.845**	29.77**	0.924**	29.66**
	(0.0475)	(3.805)	(0.0709)	(5.089)	(0.0633)	(5.395)
Observations	5054	5054	2435	2435	2619	2619

Standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Source: Author's calculations based on data from UNPS.

TROISIÈME CHAPITRE -
DISABILITY AND LONG TERM COPING STRATEGIES IN INDONESIA

ABSTRACT

A disability shock exposes households to material insecurity due to the burden of out-of-pocket expenditures it is associated with, but also because of the labour income losses it can involve. An exploration of the literature reveals that studies on the impact of disability on household welfare in Low and Middle Income Countries are scarce. Moreover, due to a lack of data, existing papers are limited to short-term analysis, relegating the knowledge regarding long run mechanisms to a black box. In order to fill this gap, we rely on a unique Indonesian longitudinal dataset whose observations are followed through 17 years. The goal of this study is to analyse the coping mechanisms adopted by households with disabled members. The results of our estimations, based on a fixed effects model, reveal that households accommodate such a health shock by decreasing their non-health related expenditures. The negative effect observed on education expenditures reveals that disability of households' adult members represents a threat to human capital accumulation of younger generations. Household reliance on external coping strategies is highlighted by the increase of transfers received from relatives.

3.1. INTRODUCTION

The onset of a disability within a household is likely to harm its welfare through pernicious effects on its material resources. An increase of health expenditures is the most obvious and direct output observed following such a health shock. Moreover, the household may observe a decrease in its labour income if the ailing person is an adult and/or if an adult household member has to play the role of caregiver for the disabled person (WHO, 2011).

Different strategies can be adopted by the household in order to lessen the negative impacts of a disability shock. Some of these strategies can be considered as internal to the household since they do not require any external intervention; here we can include: The reduction of consumption, the selling of assets and the augmentation of household labour supply in order to increase household's earnings. External strategies are: Borrowings from acquaintances or financial organisations and the reliance on transfers provided by relatives, government as well as non-governmental organizations (Yilma *et al.*, 2014). Since material insecurity can trigger a snowball effect, from policy perspectives it is important to understand how materially vulnerable are households following a disability of their members.

An exploration of the literature reveals that papers about the coping mechanisms of households in Low and Middle Income Countries (LMICs) following household disability shocks are scarce. Actually, existing papers on the one hand are concerned with other measures of health shock than disability; on the other hand, they focus their analysis on the short and middle run. Regarding the latter point, the study of Beegle and al. (2008) constitutes the exception. Using Tanzanian data it shows that households who experience an adult's death are exposed to a consumption reduction in the short run but no significant effect is observed in the long term. However, the authors leave it to future research to analyse coping mechanisms rendering long-term consumption insurance possible. That being said and as underlined by Mitra and al.

(2016) or Dhanaraj, Srinivasan, Mahambare, Ramach, Kumar, Kumar and Sankar (2015), there is a need for studies that use long-term data. The contribution of this paper is to fill this gap observed in the literature by relying on longitudinal data, that covers 17 years, to analyse households' coping strategies following a disability shock. Our data come from the Indonesian Family Life Survey (IFLS).

Indonesia is a country located on the Pacific Ring of Fire (an area with intense tectonic activity), which is exposed to recurrent natural disasters such as: Earthquakes, tsunamis, volcanic eruptions, floods and landslides. Table 3.1 below presents the occurrence of natural disasters between 1980 and 2014 in Indonesia.

Table 3. 1
Occurrence of natural disasters in Indonesia between 1980 and 2014

Type of Disaster	Number of Occurrence	Death (Person)	Total Affected (Person)	Economic Damage (Indoneasian Rupiah)
Flood	154	6,408	8,357,541	6,378,016,000
Earthquake and Tsunami	85	179,441	8,505,943	11,479,576,000
Landslide	49	2,081	397,783	121,745,000
Volcanic Activity	42	729	930,153	530,190,000
Wildfire	9	300	3,034,478	9,329,000,000
Storm	6	27	15,188	1,000,000
Drought	6	1,266	1,083,000	89,000,000
Total	351	190,252	22,324,086	27,928,527,000

Source: Japan International Cooperation Agency (2015)

As highlighted by the Japan International Cooperation Agency (2015), these disasters are responsible for injuries and trauma that may result in disabilities. In an attempt to analyse the health burden of one the strongest earthquakes experienced by Indonesia (the *Sumatra earthquake* that occurred on the 30th September 2009), Sudaryo, Endarti, Rivany, Phalkey, Marx and Guha-Sapir (2012) found that disability scores were significantly higher among injured compared to non-injured people. It would

have been interesting to analyse the role played by natural disasters in the disability shock in the present paper; unfortunately, the IFLS does not provide information about the cause of disability.

According to the World Report on Disability (WHO, 2011), the prevalence of disability in Indonesia is 21%[78]. Such a statistic is higher than the one observed at the world level, which is 15%. Starting in 2006, a pilot programme was launched in five provinces (out of 27) and extended to five new provinces in 2008. Although the goal was to provide people suffering from a severe disability with a cash transfer, a tiny proportion of the targeted population has actually been covered by the programme[79] (Adioetomo *et al.*, 2014). Indonesia is in the process of the implementation of a national health insurance program since 2014 whose objective is to cover the entire population including People living with a disability (PWDs) by 2019.

Social protection for PWDs is a mean that may lighten the financial repercussion of disability on the household. Actually there is much evidence (Tibble 2005; Zaidi and Burchardt 2005; Braithwaite and Mont 2009) showing that compared to their non-disabled counterparts, households with disabled people face extra costs that include expenditures on items like medical care or access to information. Such a conclusion has also been validated in the case of Indonesia (Adioetomo *et al.*, 2014). However, as highlighted by Adioetomo *et al.* (2014), social protection programmes in Indonesia fail to explicitly take into account those additional costs experienced by households with disabled members.

As noticed above, in parallel with these extra expenditures, households may be confronted with a drop of their earnings. Disability represents a barrier to labour supply and thus affects the amount of income the household can rely on for living.

[78] Statistics based on a 2007 Survey.
[79] IFLS does not provide information about this cash transfer so, we are not able to identify households that receive such a transfer in our sample.

Recent statistics from Indonesia show that 56% of people[80] with a moderate disability work while the proportion drops to 26% for the group with a severe disability; the proportion is 64% for those without disabilities (Adioetomo *et al.*, 2014). The burden in earnings drop may also increase if family members involvement in caregiving activities lead them to sacrifice their labour market activities (Bales, 2013).

The goal of this study is to understand to what extent disability affects households in Indonesia in terms of health expenditures and labour income. Our aim is also to explore coping mechanisms adopted by households to deal with the disability shock. Contrary to the few existing studies in the LMICs context, that have limited their analysis to a short-term analysis due to a lack of data, this paper will focus on the long-term. Impacts of disability on households may be stronger in the long run than in the short term since borrowing appears to be the most recurrent coping strategy in LMICs in general (Islam and Maitra, 2012; Bales, 2013; Mohanan, 2013) and in Indonesia in particular (Gertler *et al.*, 2009; Genoni, 2012). In fact, households who rely on borrowing as a coping strategy may have to face high interests repayments in the long term leading them to worse material insecurity than in the short term (Mitra *et al.*, 2016; Dhanaraj *et al.*, 2015).

Our paper is structured as follows: The second section presents the literature review and the third section exposes data used for our analysis. The fourth section concerns the empirical strategy while the fifth section focuses on the results. The conclusion is presented in the sixth section.

[80] People who are at least 15 years old.

3.2. LITERATURE REVIEW

In accordance with the International Classification of Functioning, Disability and Health (ICF) [81] developed by the WHO, functional limitations and activities limitations (e.g: difficulty walking, eating) are used as measures of disabilities in existing studies depending on data availability. An exploration of the literature on households coping strategies following a disability shock reveals that the debate revolves around households' ability to insure consumption. Based on American data, Stephens' (2001) study reveals that following a disability shock, households are able to insure their consumption in the short term because of the small drop in household income. However, beyond this time horizon the hypothesis of consumption insurance is invalidated reflecting households' vulnerability in the long run. The evidence of the increasing deterioration of households' welfare in the long term is confirmed by Meyer and Mok[82] (2013); however, unlike Stephens (2001) they find a small drop in short-term consumption.

Studies based on LMICs are scarce and do not rely on long-term data; they are presented in what follows. Bales (2013) and Mitra *et al.* (2016) focus on Vietnam. These authors agree that Vietnamese households insure their consumption despite an increase of health expenditures due to disability. However, a difference is observed in the coping mechanisms adopted. While in the first paper transfers (formal as well as informal) received help the household deal with the effects of the shock, in the second one, a set of strategies are adopted such as asset selling, loan uptaking and school expenditure reduction.

Contrary to the previous authors, Islam and Maitra (2012) investigate the Bangladesh context and conclude that access to microcredit plays a great role in consumption

[81] According to ICF, PWDs are those who, due to health conditions, suffer from impairments (e.g : blindness, deafness), activities limitations (e.g : difficulty eating, walking…) or participation restrictions (e.g : facing discrimination in transportation, employment) (WHO, 2011)
[82] Their results are also based on American data.

insurance. Actually, those who are not affiliated to microfinance institutions (MFI) have to sell their livestock in order to insure their consumption while MFI membership prevents households from livestock depletion. For their part, Heltberg and Lund (2009) are interested in Pakistani data; their results reveal that households with a disabled member are more exposed to food insecurity. However, it is worth noticing that, despite the risk of recall bias (Ravallion, 2014; Mitra *et al.*, 2016), Heltberg and Lund use a retrospective module for information about disability shocks and coping strategies. Actually households are asked if they experienced a disability shock during the three previous years and what kind of strategies they adopted following such a shock.

To the best of our knowledge, only three papers are interested in the coping mechanisms of households facing disability shocks in Indonesia. Gertler and Gruber (2002) find that a disability shock decreases household earnings and prevents it from insuring the consumption of its members and the effect increases with the severity of disability. However in a later study that attempts to deepen the previous paper, Gertler *et al.* (2009) found that access to microfinance allows affected households to insure their consumption because of loans and savings opportunities. For his part, Genoni (2012) does not find any significant effect of disability on household non-medical expenditures. An attempt to determine which mechanisms allow the household to insure its consumption despite the health shock reveals that households rely on transfers from non co-residents family members instead of wealth depletion.

The rest of papers presented below are based on other LMICs and use measures of health such as illness, injury, death or Body Mass Index (BMI). Some authors find that households are not able to insure their non-health consumption following a health shock. This is the case for Wagstaff (2007), Wagstaff and Lindelow (2014) and Somi, Butler, Vahid, Njau and Abdulla (2009).

Among studies that find evidence of consumption insurance, resort to borrowing appears to be the recurrent strategy (Mohanan, 2013; Sparrow, Poel, Hadiwidjaja, Yumna, Warda and Suryahadi, 2014; Yilma *et al.*, 2014; Dhanaraj *et al.*, 2015; Khan, Bedi and Sparrow, 2015). The other external (to the household) strategy is transfers from relatives (Sparrow *et al.*, 2014). Internal strategies vary from assets selling (Grimm, 2006; Yilma *et al.*, 2014; Khan *et al.*, 2015) to savings depletion (Yilma *et al.*, 2014) or an increase of labour supply (Grimm, 2006).

An issue that arises when analysing the impact of disability on the outcomes of interest is endogeneity that can have three sources: Error in the measurement of disability, reverse causality and variable omission. Concerning the first source, measures of disability in household surveys generally come from self-reporting and thus can be influenced by the respondent's socio economic status. Reverse causality arises because besides the effect of disability on household income or expenditures, for example, there is evidence that those two variables can also determine the level of disability in the household. Concerning variables omission, there are some unobservable variables such as preferences that can influence disability and the outcomes of interest simultaneously.

The use of a quasi-experimental method or of instrumental variables is recommended to control for endogeneity. However, since it is not obvious to find valid instruments on the one hand, and that data allowing researchers to rely on quasi-experimental methods are not always available on the other hand, many researchers rely on a fixed effects method in the presence of endogeneity. Studies presented above generally use a fixed effects method; few of them are based on a quasi experimental method

(Mohanan, 2013)[83] or an instrumental variable setting (Islam and Maitra[84], 2012; Genoni[85], 2012).

To summarize our literature review, it appears that studies concerned with the impact of a disability shock, in particular, and health shock, in general, agree on the increase of health expenditures following such a health shock, most of them conclude that households are able to insure their short term consumption following health shocks. Borrowing appears to be the most recurrent strategy adopted.

A formal summary of hypothesis drawn from the existing literature. The household's utility U depends on its consumption of health related goods/services *H* and the consumption of non-health related goods/services (*C*). U may also be influenced by unobservable factors *k.* That is $U = U(H, C, k)$. Since a disability shock may lead to an increase of *H*, we can write $H=H(D)$, so that *U* is written $U=U(H(D), C, k)$. Household members face a budget constraint as well as a time constraint. Regarding the first constraint, it can be written as follows: $P_H H + P_C C = Lw + Y$. In this equation P_H and P_C represent the price associated to *H* and *C* respectively. *Y* represents household non-earned income, *w* is the hourly wage while *L* corresponds to the time spent in the labour market. Concerning the time constraint, individuals have to split their time between economic activities and non-economic activities so that $T=L+l$. The combination of these two constraints results in:
$P_H H + P_C C + wl = wT + Y$. The household has to maximise its utility:

Max $U(H, C, k)$ subject to: $P_H H + P_C C + wl = wT + Y$.

The first orders conditions result in what follows:

[83] The exogenous shock is a bus accident.
[84] Microcredit receipt is instrumented by the probability that the household is eligible in a program village.
[85] Disability is instrumented by the interaction between changes in prices of health services and individual demographic characteristics (age and gender).

$$U_H^{'} = \lambda P_H \text{ and } \quad U_C^{'} = \lambda P_C \quad => \quad \frac{U_H^{'}}{U_C^{'}} = \frac{P_H}{P_C}$$

In line with the theoretical framework proposed by Mitra et al. (2016), a disability shock can affect both income and households' consumption. In other words, at the household level, a disability shock is associated with an increase in health expenditures as well as a decrease in labour income. Affected households can rely on several coping strategies to make ends meet. They can choose to increase their income (eg: more labour supply) or to reduce their non-health consumption. These effects are presented below.

We assume that following a disability shock, the direct effect is generally an increase of the health related expenditures *H*, so that we can write $\frac{\partial H}{\partial D} > 0$. If the disabled people are adults, their labour supply *L* can be affected leading to a decrease of the earned income Z=*Lw*, that is $\frac{\partial Z}{\partial D} < 0$.

Due to the increase of health related expenditures *H* and/or the decrease of earned income *Z* following a disability shock, households have to adopt strategies in order to survive. The strategy can consist of a decrease of non-health expenditures C and/or an increase of the material resources necessary to finance household consumption. C is an aggregate that is composed of food expenditures F, education expenditures E and non-food expenditures NF (other than H and E). So we have

$$\frac{\partial C}{\partial D} < 0; \ \frac{\partial F}{\partial D} < 0; \ \frac{\partial E}{\partial D} < 0; \frac{\partial NF}{\partial D} < 0$$

The increase of material resources could be possible through transfers TF[86] ($\frac{\partial TF}{\partial D} > 0$), asset (A) selling ($\frac{\partial A}{\partial D} < 0$) or an increase of household labour supply and thus labour income ($\frac{\partial Z}{\partial D} > 0$)[87].

There are other factors that have an influence on household expenditures and consumption. For example, large households as well as married people are more likely to have higher consumption expenditures than their counterparts, and thus have to rely on a higher labour income or on transfers. Households with a large proportion of children are more likely to have higher education expenditures than those with a low proportion of children. Furthermore, households with old household heads are more likely than their counterparts to have low labour income and rely on remittances.

The first hypothesis to test is that following a disability shock or an increase of the severity of disability in the household, the amount of health related expenditures increases (H). Regarding labour income, we expect it to decrease; our assumption is that the increase of labour supply will not generate enough money to compensate the loss of the income that used to be earned by the disabled family member.

The second hypothesis is that households reduce all of their non-health related consumption (F, NF, E).

The third hypothesis is households will experience an increase in the following: borrowing, transfers, asset selling.

[86] TF s included in Y.
[87] It is worth recalling that the effect on labour income could be either positive or negative.

Following this exploration of the existing literature, we will present the source of data used to conduct our analysis in the next section.

3.3. SOURCE OF DATA

Our panel data come from the Indonesian Family Life Survey (IFLS). This is a longitudinal socioeconomic survey composed of five waves that covers 21 years. The target was to follow the original households as well as their split off through years. The first wave (IFLS1) was realised in 1993 and was based on a sample of individuals living in 7224 households and representing 83% of the Indonesian population.[88] Information for the second wave (IFLS2) was collected four years later (1997) from the original households sample as well as split off households. IFLS3 and IFLS4 were respectively fielded in 2000 and 2007. The last wave called IFLS5 reflects 2014's data. IFLS retention rates vary from 95% to 91% through the waves.

In the present paper, we are not able to use data from the first wave because individual questions (notably the health module) were asked only for a selected number of household members; this prevents us from knowing with certainty the disability status of all household members. The fourth wave is also excluded from our analysis since information about disability is only asked for those who are at least 40 years old. Thus, our analysis uses information collected in 1997, 2000 and 2014. Households in our sample have been followed for 17 years. We do not include split off households in our sample either since individual questions are asked for a selected number of people in these households. Our sample consists of 2359 households who are present through the three waves of interest[89].

[88] That is the population of the first wave represents 83% of the Indonesian population, since the sample includes only 16 of the 27 provinces in the country.

[89] In split-off households, questions on disability status are only asked for a selected number of household members, so that we cannot identify the prevalence of disability in these households. That is why we have excluded them from our sample. That being said, our sample is representative of old generations since young generations are those who leave the original households to form split-off households.

Following Gertler and Gruber (2002) and Gertler *et al.* (2009), we use information about Activities of Daily Living (ADLs) to build a disability index. ADLs have been used by the medical staff since 1960's in the diagnosis of disabilities (Wallace, Herzog, Ofstedal, Fonda, Steffick, Langa, Fisher, Fultz, Weir and Faul, 2004). In the Indonesian survey, household's members who are at least 15 years old are asked for their ability: 1) to carry a heavy load (like a pail of water) for 20 meters; 2) to draw a pail of water from a well; 3) to walk for 5 kilometres; 4) to sweep the house floor yard; 5) to bow, squat, kneel ; 6) to stand up from a sitting on the floor without help ; 7) to stand up from sitting position in a chair without help. Each of these ADLs related questions has a three-point answer scale: (1) easily; (2) with difficulty; (3) unable to do it. Based on these answers and following Gertler and Gruber (2002) and Gertler *et al.* (2009), we build a disability index.

It is worth highlighting there are drawbacks associated to the use of ADLs as a measure of disability (see chapter one for a discussion about the limits of the measurement). However, we use them in our study because we do not have access to a better disability measurement.

We build the disability index following three steps. Firstly, for each adult in the household, we calculate an individual total score by obtaining the sum of their answers to the ADLs questions; that is someone who says he has difficulty to bow, squat, kneel, will have a score of 2 for that specific ADL, if instead he says he is unable to sweep the house floor yard, he will have a score of 3 for that specific ADL and so on. The minimum total score someone can have for the seven ADLs considered is 7 (someone who does not have difficulty performing each of the seven ADLs ie whose score is one for each ADL) and the maximum is 21 (someone who is unable to do all the seven ADLs). The formula used to calculate the individual total score is presented below:

Individual total score:

Answers: (1) easily, (2) with difficulty, (3) unable to do it.

$$Score = \Sigma\ answers$$

The second step consists of building an individual adult ADLs index by dividing the difference between the actual score and the minimal score by 14 a figure that represents the difference between the maximum and the minimum scores. In order to obtain a percentage, Individual ADL indices are multiply by 100. Thus, individual ADLs indices vary between 0 to 100 reflecting the severity of the disability.

Individual ADL index

$$Individual\ ADL\ Index = [(Score - MinScore) / MaxScore - MinScore] * 100$$

The last step corresponds to the construction of an ADLs index at the household level (HH ADL index); we divide the sum of individual ADLs index (of all adults in the household) by the number of adults in the household. This can thus reflect the level of household adult disability.

HH ADL index

$$HH\ ADL\ Index = \Sigma\ individual\ ADL\ index/\#\ adults$$

3.4. METHODOLOGY

We use a fixed effects approach for our data analysis. The specification below is used to analyse the impact of disability on material outcomes.

$$Y_{it} = \beta_0 + \beta_1 D_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where *t* and *i* represent respectively a given wave and household. *Y* successively represents the monthly value of each of the following outcomes: Labour income, transfers received from relatives, assets, health expenditures, and non-health expenditures. This last variable includes food expenditures, spending on education and other non-food expenditures. *D* is the indicator of the level of disability in the household; in other words *D* is the household ADLs index (HH ADL index). *X* is a set of controls: Household size, share of household members under age 15 years, share of household adult male members (those over age 14) and characteristics of the household head (age, marital status, level of education). β_0, β_1 and γ represent coefficients to be estimated. μ_i and λ_t are respectively the household fixed effects and the time fixed effects, while ε_{it} is the idiosyncratic error term. Ordinary Least Squares (OLS) are used to estimate our regressions (see chapter one for details about this method and its limits).

3.5. RESULTS

In this section we present descriptive statistics before examining regression results. Since we are concerned with the long-term effect of disability, households who live with disabled members in only one or two waves are excluded from our analysis. Thus, households that have, for example, a strictly positive ADLs index in 1997 and 2000 but not in 2014 are not considered as having experienced disability in the long term. Our descriptive statistics (Table 3.2) show that between the first and the last wave of our panel, the severity of disability increases (9 to 15%) while health expenditures[90] rise; such a scheme may be explained by population aging (UNFPA, 2014). Concerning the other outcomes of our study, in general, we observe an increase of their value between 1997 and 2014 reflecting decrease in poverty over time (World Bank, 2016).

[90] Inflation rate has been taken into account ; thus, the value of income, expenditures and assets are in real terms.

The decrease of household size (from 5 to 4 between 1997 and 2014) or the reduction of the proportion of children (26 to 19%) on the one hand and the increase of the adult male share (33 to 35%) or the rise of the head's age (51 to 56 years old) on the other hand are a reflection of a fact: over time, individuals grow up/get old, die or leave the dwelling.

Table 3. 2
Descriptive statistics

	1997		2014	
	Mean	SD	Mean	SD
Health	91763.3	350439.2	120862.8	722737.5
Food	1547737	2308545	1181279	996549
Non_Food	648131	1331322	1039910	2336486
Education	266647	720857.3	275525.2	545633
Consumption	2462515	3201540	2496038	3022175
Remittances	230974.7	533741.2	6377221	3.63e+07
Labour_Income	1818767	2398326	2001267	4600482
Assets	1.59e+08	4.83e+08	1.69e+08	2.64e+08
HH ADL index	9%	10.100	15%	14.611
HH size	5	2.174	4	1.915
Adult Male Share	33%	.175	35%	.233
Head age	51	13.626	56	13.739
Head education				
None	19%	.388	16%	.355
Primary	53%	.499	44%	.494
Secondary	23%	.421	31%	.455
Above secondary	5%	.214	9%	.282
Child Share	26%	.207	19%	.199
Head married	82%	.382	71%	.455
Observations	2359		2359	

Income, expenditures and assets are expressed in Indonesian Rupiah. Inflation rate has been taken into account; thus, the value of outcome are in real terms
Source: Authors' calculations based on data from IFLS.

While primary education is the most represented level of education whatever the year considered, we notice an increase in the proportion of household heads with a post secondary level of education (5 to 9%). This is explained by the fact that over time old/deceased household heads are replaced by a younger generation with a higher

level of education. The proportion of married heads drops by 11% because of a partner's death. It is worth recalling that in our study we do not include split-off households (ex: young people leave their parent home to form their own family) which represent 62% of the households interviewed in the last wave of the survey. That being said, our sample is mostly composed of older generations and this may explain the increase in households ADLs index over years. Furthermore, as highlighted previously, what we name "disability" may be either a temporary or a permanent disability.

An exploration of the database at the individual level (table 3.3) reveals that several patterns can be observed regarding the variation of health status across years. For example, out of the 8467 adults of our sample, 1090 who declared a functional limitation in waves two and three did not have any functional limitation in wave one. 2842 were suffering from functional limitations in wave three but not in wave one or three. We also have 739 people who declared a functional limitation during the first and the third wave of the survey, but not during the second wave. That being said, the functional limitation declared by people during the survey may be either a temporary disability or a permanent disability.

Table 3. 3
Variation of individual disability status across waves

Disability status by wave				
Wave 1	Wave 2	Wave 3	**Observations**	**Proportion**
No	Yes	Yes	1090	12.87
No	No	Yes	2842	33.57
No	No	No	2219	26.21
No	Yes	No	303	3.58
Yes	Yes	Yes	938	11.08
Yes	Yes	No	117	1.38
Yes	No	No	219	2.59
Yes	No	Yes	739	8.73
Total			8467	100

Source: Authors' calculations based on data from IFLS.

The output of our regressions tends to confirm the predictions drawn from the existing literature. Our results (Table 3.4) show that the level of medical expenditures (column 1) for a household increases with the severity of disability. When the HH ADLs index increases by 1%, medical expenditures increases by 2.37%. Thus, the positive sign we predicted above is confirmed by the results. Such a conclusion corroborates those found by other researchers based on data from developing as well as developed countries (Mitra, Findley and Sambamoorthi, 2009; Burton and Phipps, 2009; Mitra *et al.*, 2013). Another effect of disability on the household is the decrease of labour income as shown in the seventh column of table 3.4 below. An increase in the HH ADLs index by 1% leads to the reduction of labour income by 1.19%; this confirm the sign predicted above. There are actually several studies that reveal that disability has a negative impact not only on the disabled's labour supply but also on the caregivers labour supply (Jolly, 2013; Polidano and Vu, 2015; Lemmon, 2015).

Contrary to Genoni (2012), our results do not show any evidence of non medical-consumption smoothing. Thus, this reflects the fact that, even if in a short term households are able to insure their non-medical consumption despite the presence of disability, in the long term the inversion of such a trend is observed. This may be explained by the pernicious effect of debt accumulation for households in the long run (Barbier, López and Hochard, 2016), since we saw in the literature review that borrowing[91] appear to be the main coping strategy of affected households.

The evidence of households' inability to maintain consumption expenditures following a disability shock is robust even after a disaggregation of non-medical spending (food, non-food, education expenditures). The highest effect is observed on educational expenditures (column 4) followed by food expenditures (column 2). When the HH ADLs index increases by 1%, the education and food expenditures decrease respectively by 1.42 and 1.37%.

It then appears that disability represents a threat to investments in child human capital and may expose households to food insecurity as shown in previous studies (WHO, 2011; Mitra *et al.*, 2016). We also observe a decrease in the level of household assets suggesting that asset depletion is one of the means adopted by households after a disability shock, as stated in our literature review. Household reliance on external coping strategies is highlighted by the increase of transfers received from relatives[92].

Concerning controls, we find that the higher the proportion of adult male share in the household, the higher the non health related consumption expenditures (column 5),

[91] We could not check the effect of disability on borrowings in this paper for two reasons: 1) information about loans does not appear in all the waves, 2) when it exists the question regarding loans is not uniform through waves and thus not comparable.

[92] We have also done an analysis where the interaction between remittances and disability is one of the regressors (Appendix 3.1). Results show that the higher the remittances, the higher the possibility for households affected by disability to maintain their consumption.

labour income and value of assets. This makes sense since the highest contribution in household earnings in Indonesia comes from adult males (Sohn, 2015). In contrast to what we observed for the adult male share, households with a high proportion of children are more likely to spend more money on education, but less on other non-food goods, they receive less remittances and have a lower level of earnings and assets.

Table 3. 4
Estimation of the effect of disability on expenditures, income and assets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Health	Food	Non Food	Education	Consumption	Remittance	Labour	Assets
ADL index	0.0237**	-0.0137**	-0.00840**	-0.0142*	-0.00817**	0.00658*	-0.0119**	-0.00517*
	(0.00602)	(0.00328)	(0.00159)	(0.00705)	(0.00138)	(0.00321)	(0.00300)	(0.00226)
HH size	0.223**	0.128**	0.144**	0.621**	0.131**	0.0236	0.201**	0.132**
	(0.0393)	(0.0110)	(0.00964)	(0.0560)	(0.00746)	(0.0218)	(0.0147)	(0.0161)
% Male	0.536	0.571**	0.0624	0.199	0.306**	0.221	0.645**	0.550**
	(0.421)	(0.200)	(0.110)	(0.553)	(0.0905)	(0.224)	(0.191)	(0.172)
Head Age	0.00202	-0.00450*	-0.00886**	-0.0362**	-0.00606**	0.0131**	-0.00984**	0.00526*
	(0.00600)	(0.00182)	(0.00156)	(0.00864)	(0.00116)	(0.00357)	(0.00247)	(0.00238)
Primary	-0.0492	0.0339	0.0791	0.0368	0.0763+	0.0624	-0.0398	0.0255
	(0.206)	(0.0767)	(0.0516)	(0.256)	(0.0411)	(0.103)	(0.0838)	(0.0712)
Secondary	-0.370	-0.0896	0.00932	0.400	0.00905	-0.0857	-0.0590	0.00172
	(0.267)	(0.0851)	(0.0701)	(0.360)	(0.0544)	(0.141)	(0.118)	(0.0970)
Above	-0.123	0.114	0.195+	1.754**	0.286**	-0.192	0.293+	-0.0131
	(0.465)	(0.109)	(0.109)	(0.608)	(0.0816)	(0.267)	(0.150)	(0.141)
% Children	0.529	0.0706	-0.533**	8.064**	-0.137+	-0.597*	-0.526**	-0.208
	(0.434)	(0.163)	(0.108)	(0.579)	(0.0829)	(0.236)	(0.162)	(0.165)
Married	0.279	0.454**	0.306**	0.898**	0.297**	-0.100	0.0660	0.268**
	(0.188)	(0.0802)	(0.0498)	(0.256)	(0.0402)	(0.105)	(0.0718)	(0.0705)
Constant	4.926**	13.31**	12.19**	3.785**	13.81**	10.21**	13.11**	16.73**
	(0.701)	(0.266)	(0.178)	(0.900)	(0.142)	(0.376)	(0.258)	(0.259)
Obs	6916	6923	6922	6921	6923	5441	6049	6877

Robust standard errors in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$. Outcomes in Log. Source: Authors' calculations based on data from IFLS.

In general we notice a positive association between household size and each of the considered outcome showing that household expenditures increase with the number of people who share the dwelling; and household material resources increase with the household size since households are mainly composed of adults. In accordance with the human capital theory which predicts a positive relationship between education level and earnings and draws attention on the intergenerational transmission of human capital (Psacharopoulos, 2014), our results reveal that an increase in the education level of the household head (who is the main bread winner) appears to be beneficial for labour income, non-health related consumption as well as education expenditures. Further analysis shows a negative correlation between the household's head's age and his education level and this may explain why the older the head of the household, the lower the levels of non-food consumption and education expenditures.

When the head is married, household expenditures and material resources in general increase. Further analysis (not shown in the table) suggests that education endowment appears to play a role in this relationship since there is a positive correlation between being married and having a higher level of education; married household heads are also younger than household heads without a partner.

An analysis of our sample using a random effects model (Appendix 3.1) reveals that the magnitude of the effect of a variation in the severity of disability (that is in absolute terms) on the outcomes of interest are slightly higher than what we observed when we relied on a fixed effects model. This suggests that there is a mis-specification of the model when we use a random effects model.[93]

As stated previously, the fixed effects model used in our study has some limitations that are likely to introduce biases in our results. Faced with the inability of finding a

[93] We did a Hausman test that leads us to this conclusion. The level of significance is 5%.

better methodology[94], we will at least discuss about the direction of the bias. Measurement errors will lead to an underestimation of the effect of disability in cases where the true value of the estimated coefficient is positive and an overestimation of the effect if the true value of the coefficient is negative (Wooldridge, 2010; Greene, 2012). Regarding reverse causality, two cases can be considered (Bloom, Zhu and Unlu, 2010). If the sign of the potential effect of the outcome Y on the disability index D is similar (resp. opposite) to the sign of the effect of D on Y, therefore disability's coefficients presented in table 3.4 are overstated (resp. understated). Thus, apart from health expenditures and remittances, the effect of disability on all the outcomes in table 3.4 maybe overestimated.

Our last point concerns omitted variables. The direction of the bias generated by omitted variables is unknown. That being said, it is hard to have a precise idea of the direction of the final bias generated by these three sources of endogeneity in our analysis.

In order to check the robustness of our results, we use an alternative measure of disability. It is built as follows: We take the maximum score (1, 2 or 3), whatever the ADL considered, associated with each adult member. That is, someone who is unable to do at least one of the ADLs has a score of 3, while a score of 1 is given to the person who does all the ADLs easily. Finally, a score of 2 is given to the individual who declares he has difficulty doing any of the ADLs (but is not unable to do any of the ADLs). We sum these scores at the household level then divide the result by the number of adults in the households. The results confirm the increase of health expenditures and the decrease of labour income following a disability shock. The hypothesis of long-term consumption insurance is rejected (see Appendix 3.3).

[94] We have done an analysis where HH ADLs indices are replaced by their lagged values (Appendix 3.2). Coefficients are non significant; thus reverse causality is a possible source of endogeneity in our main regressions.

3.6. CONCLUSION

The question of consumption insurance appears to be at the core of the debate in the literature about households coping mechanisms following a disability shock. An insight into the LMICs context shows that studies generally conclude that in the short-run, households are able to insure their non-health consumption. This is made possible by a reliance on external as well as internal strategies such as borrowing, transfers or asset depletion. Due to a lack of data, the veil has not been lifted concerning long-run mechanisms. This paper is a contribution to the literature in that respect. Using a longitudinal dataset from Indonesia, we are able to follow households for almost 20 years.

Our analysis, based on a fixed effects model, allows us to conclude that disability shocks expose households to an increase in health expenditures and a drop in total labour income. Despite an increase in transfers received from relatives, households face asset depletion as well as a decrease of their non-health expenditures. Further analysis shows that none of the components of this latter aggregate are spared from the corollaries of disability shocks. That is, food expenditures, spending on education and other non-food expenditures experience a drop. It is worth noting that educational expenditures are associated with the highest decrease; this constitutes a threat to human capital accumulation. The consumption insurance hypothesis which is validated in the short run by previous studies is thus rejected when considering the long run. This shows that households tend to adopt adverse coping strategies that may sustain short-term consumption while compromising their long-term welfare (Bird and Prowse, 2009). It is worth noting that when we rely on our disability measure and on a fixed effects model for our analysis, the results may reflect the effect of any health condition but disability on the outcome of interest.

Following the fact that households with disabled members are more exposed to material insecurity than their counterparts and given the low coverage of PWDs by

benefits and the low amount of these benefits, a recommendation can be drawn for policy makers. It is important to assess if an increase of the amount of disability benefits as well as an expansion of the coverage (i.e. all eligible PWDs receive benefits) could lighten the burden of households affected by disability and is cost-effective.

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APPENDIX

Appendixes 3.1 to 3.3 are presented below.

Appendix 3.1

Estimation of the effect of disability on expenditures, income and assets (Random effects model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Health	Food	Non Food	Education	Consumption	Labour Income	Assets	Health
ADL Index	0.0233**	-0.0125**	-0.00937**	-0.0212**	-0.00853**	0.00789**	-0.0146**	-0.00709**
	(0.00448)	(0.00288)	(0.00145)	(0.00535)	(0.00125)	(0.00254)	(0.00220)	(0.00203)
HH Size	0.217**	0.168**	0.164**	0.656**	0.152**	0.0883**	0.209**	0.146**
	(0.0275)	(0.00852)	(0.00767)	(0.0364)	(0.00592)	(0.0138)	(0.00995)	(0.0123)
% Adult Male	-0.207	0.323+	-0.141	-0.286	0.144+	0.0185	0.369**	0.221
	(0.320)	(0.169)	(0.0962)	(0.398)	(0.0835)	(0.163)	(0.135)	(0.143)
Head Age	0.000171	-0.00601**	-0.00498**	-0.0309**	-0.00419**	0.0253**	-0.00913**	0.0113**
	(0.00421)	(0.00140)	(0.00134)	(0.00592)	(0.000954)	(0.00233)	(0.00163)	(0.00191)
Primary	0.536**	0.209**	0.313**	0.842**	0.211**	0.218**	0.204**	0.217**
	(0.143)	(0.0521)	(0.0445)	(0.175)	(0.0345)	(0.0695)	(0.0561)	(0.0568)
Secondary	0.801**	0.472**	0.837**	2.120**	0.543**	0.757**	0.773**	0.783**
	(0.168)	(0.0537)	(0.0528)	(0.210)	(0.0394)	(0.0891)	(0.0670)	(0.0697)
Above	1.423**	0.799**	1.434**	3.658**	1.034**	1.088**	1.384**	1.485**
	(0.253)	(0.0695)	(0.0731)	(0.298)	(0.0527)	(0.143)	(0.0794)	(0.0958)
% Children	-0.322	-0.217+	-0.763**	8.645**	-0.298**	-0.629**	-0.923**	-0.670**
	(0.346)	(0.125)	(0.0983)	(0.431)	(0.0744)	(0.180)	(0.127)	(0.145)

Head married	0.267^{+}	0.223**	0.142**	0.663**	0.177**	-0.214**	0.0668	0.170**
	(0.138)	(0.0512)	(0.0406)	(0.184)	(0.0323)	(0.0707)	(0.0523)	(0.0573)
Constant	5.222**	13.04**	11.67**	2.590**	13.49**	8.994**	12.93**	16.11**
	(0.494)	(0.165)	(0.137)	(0.558)	(0.102)	(0.256)	(0.194)	(0.186)
Observa Tions	6916	6923	6922	6921	6923	5441	6049	6877

Robust standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
We used the logarithm of outcomes in our regressions.
Source: Authors' calculations based on data from IFLS.

Estimation of the effect of disability on expenditures, income and assets
(Interaction between ADL index and remittances included as a control)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Health	Food	Non Food	Education	Consumption	Labour Income	Assets
ADL index	0.0157	-0.0211^{+}	-0.0123	-0.0263	-0.0175**	-0.0251	-0.0119
	(0.0338)	(0.0121)	(0.00796)	(0.0420)	(0.00617)	(0.0168)	(0.0140)
Remittances	0.133*	-0.00255	0.0321*	-0.0511	0.00539	-0.0230	0.0465*
	(0.0553)	(0.0137)	(0.0138)	(0.0711)	(0.00960)	(0.0192)	(0.0199)
(ADL index) x (Remittances)	0.000807	0.000846	0.000363	0.00138	0.000870^{+}	0.00119	0.000484
	(0.00278)	(0.000973)	(0.000672)	(0.00362)	(0.000515)	(0.00144)	(0.00119)
HH size	0.214**	0.127**	0.141**	0.690**	0.135**	0.214**	0.142**
	(0.0459)	(0.0124)	(0.0117)	(0.0647)	(0.00895)	(0.0181)	(0.0185)
% Adult Male	0.612	0.818**	0.102	0.458	0.376**	0.427^{+}	0.515*
	(0.480)	(0.246)	(0.134)	(0.667)	(0.111)	(0.255)	(0.208)
Head age	-0.00307	-0.00299	-0.00991**	-0.0409**	-0.00672**	-0.0107**	0.00507^{+}
	(0.00695)	(0.00207)	(0.00178)	(0.0106)	(0.00135)	(0.00275)	(0.00286)
Primary	-0.147	0.125	0.0904	0.113	0.114*	-0.00149	0.0541
	(0.232)	(0.0875)	(0.0609)	(0.301)	(0.0497)	(0.107)	(0.0863)

Secondary	-0.423	-0.0411	-0.0152	0.654	0.0171	0.0277	0.0607
	(0.307)	(0.101)	(0.0837)	(0.429)	(0.0677)	(0.142)	(0.119)
Above	-0.0886	0.195	0.145	1.755*	0.289**	0.414*	0.0504
	(0.556)	(0.132)	(0.130)	(0.736)	(0.0970)	(0.200)	(0.175)
% Children	0.641	0.312	-0.584**	7.083**	-0.129	-0.589*	-0.302
	(0.504)	(0.191)	(0.127)	(0.720)	(0.0999)	(0.230)	(0.198)
Head married	0.354	0.452**	0.277**	0.617*	0.270**	0.0374	0.186*
	(0.215)	(0.0912)	(0.0586)	(0.305)	(0.0470)	(0.0886)	(0.0808)
Constant	4.312**	12.96**	12.01**	4.759**	13.69**	13.15**	16.12**
	(1.053)	(0.373)	(0.254)	(1.339)	(0.195)	(0.411)	(0.386)
Observations	5435	5437	5437	5437	5437	4723	5405

Robust standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
We used the logarithm of outcomes in our regressions.
Source: Authors' calculations based on data from IFLS.

Appendix 3.2
Estimation of the effect of disability on expenditures, income and assets
(Lagged value of disability used in the fixed effect model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Health	Food	Non Food	Education	Consumption	Remittance	Labour Income	Assets
ADL index	-0.00659	0.00203	0.00142	0.00145	0.0000621	-0.00316	0.00931*	-0.00179
	(0.00959)	(0.00398)	(0.00281)	(0.0149)	(0.00202)	(0.00687)	(0.00450)	(0.00381)
HH size	0.141**	0.140**	0.174**	0.675**	0.146**	-0.0472	0.223**	0.152**
	(0.0492)	(0.0175)	(0.0130)	(0.0761)	(0.0107)	(0.0323)	(0.0216)	(0.0217)
% Adult Male	0.368	0.771**	0.202	0.316	0.431**	0.363	0.747**	0.590**
	(0.467)	(0.237)	(0.131)	(0.675)	(0.111)	(0.291)	(0.261)	(0.207)
Head age	0.0150*	-0.00523*	-0.00818**	-0.0365**	-0.00538**	0.0163**	-0.0112**	0.00730*
	(0.00687)	(0.00247)	(0.00188)	(0.0107)	(0.00147)	(0.00462)	(0.00323)	(0.00286)
Primary	-0.334	0.0564	0.0857	0.0114	0.102	0.160	0.0640	0.00775
	(0.276)	(0.124)	(0.0727)	(0.365)	(0.0629)	(0.155)	(0.133)	(0.103)
Secondary	-0.560	-0.0930	0.00470	0.311	0.0349	0.165	0.0645	0.0935
	(0.347)	(0.130)	(0.0966)	(0.507)	(0.0831)	(0.197)	(0.171)	(0.130)
Above	-0.252	0.0985	0.211	1.955*	0.333**	-0.368	0.363+	0.0702
	(0.558)	(0.158)	(0.134)	(0.769)	(0.107)	(0.337)	(0.191)	(0.180)

% Children	0.729	0.223	-0.656**	7.869**	-0.123	-0.262	-0.746**	-0.307
	(0.512)	(0.193)	(0.134)	(0.736)	(0.105)	(0.314)	(0.212)	(0.200)
Head married	0.279	0.502**	0.275**	0.793*	0.289**	-0.0849	0.0354	0.207*
	(0.219)	(0.0951)	(0.0598)	(0.317)	(0.0479)	(0.131)	(0.0971)	(0.0851)
Constant	6.223**	12.44**	11.96**	3.746**	13.27**	10.10**	12.68**	16.20**
	(0.974)	(0.301)	(0.250)	(1.453)	(0.187)	(0.630)	(0.365)	(0.355)
Observations	4570	4575	4574	4573	4575	3656	3961	4552

Robust standard errors in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
We used the logarithm of outcomes in our regressions.
Source: Authors' calculations based on data from IFLS.

Appendix 3.3
Estimation of the effect of disability on expenditures, income and assets (alternative measure of disability)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Health	Food	Non Food	Education	Consumption	Remittance	Labour	Assets
ADL index	0.312*	-0.0887+	-0.0364	-0.171	-0.0493+	0.152*	-0.142*	-0.0454
	(0.124)	(0.0473)	(0.0321)	(0.178)	(0.0279)	(0.0651)	(0.0575)	(0.0472)
HH size	0.230**	0.133**	0.149**	0.618**	0.134**	0.0320	0.197**	0.133**
	(0.0408)	(0.0107)	(0.0101)	(0.0583)	(0.00771)	(0.0225)	(0.0149)	(0.0165)
% Male	0.373	0.694**	0.142	0.302	0.380**	0.193	0.710**	0.591**
	(0.419)	(0.202)	(0.110)	(0.549)	(0.0920)	(0.224)	(0.194)	(0.172)
Head age	0.00420	-0.00621**	-0.00999**	-0.0375**	-0.00710**	0.0133**	-0.0107**	0.00469*
	(0.00600)	(0.00186)	(0.00154)	(0.00858)	(0.00116)	(0.00357)	(0.00250)	(0.00237)
Primary	-0.0559	0.0375	0.0813	0.0406	0.0785+	0.0600	-0.0383	0.0266
	(0.206)	(0.0771)	(0.0516)	(0.256)	(0.0413)	(0.102)	(0.0843)	(0.0714)
Secondary	-0.379	-0.0852	0.0119	0.405	0.0117	-0.0893	-0.0575	0.00365
	(0.268)	(0.0853)	(0.0703)	(0.361)	(0.0547)	(0.141)	(0.118)	(0.0972)
Above	-0.115	0.121	0.201+	1.752**	0.291**	-0.179	0.283+	-0.0121
	(0.466)	(0.109)	(0.109)	(0.610)	(0.0815)	(0.267)	(0.149)	(0.140)
% Children	0.385	0.119	-0.511**	8.145**	-0.110	-0.661**	-0.465**	-0.185
	(0.439)	(0.166)	(0.109)	(0.580)	(0.0841)	(0.237)	(0.165)	(0.166)
Head married	0.307	0.440**	0.298**	0.882**	0.288**	-0.0894	0.0585	0.263**
	(0.189)	(0.0798)	(0.0498)	(0.256)	(0.0402)	(0.106)	(0.0723)	(0.0706)
Constant	4.557**	13.37**	12.20**	3.979**	13.84**	9.995**	13.26**	16.77**
	(0.736)	(0.264)	(0.184)	(0.958)	(0.149)	(0.391)	(0.259)	(0.270)
Observations	6916	6923	6922	6921	6923	5441	6049	6877

Robust standard errors in parentheses; $^{+}\ p < 0.10$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$;
We used the logarithm of outcomes in our regressions.
Source: Authors' calculations based on data from IFLS.

DISCUSSION

La survenue du handicap au sein d'un ménage est susceptible de nuire au bien-être de l'ensemble de ses membres. L'objectif de notre thèse, composé de trois articles, est d'analyser les conséquences socio-économiques auxquelles sont exposées les personnes handicapées, dans des pays en développement, mais aussi les membres de leur ménage en général et les enfants en particulier. Nos résultats révèlent, de manière générale, que le handicap est susceptible d'avoir des effets pervers sur la vie de l'ensemble des membres du ménage.

Le modèle à effets fixes dont nous nous servons pour mener notre analyse présente des limites. En effet, il ne tient pas compte de l'hétérogénéité liée aux caractéristiques non observables qui changent selon l'individu et à travers le temps. De plus, l'estimation de l'impact d'un régresseur n'est possible que si ce dernier varie au cours du temps. Face à la difficulté à trouver des instruments valides, nous ne pouvions avoir recours à une meilleure méthodologie. Néanmoins, dans les trois articles, nous utilisons des méthodologies alternatives pour vérifier la robustesse de nos analyses; les résultats qui en découlent doivent cependant être pris avec précaution.

Il est toutefois important de souligner que puisque nos données proviennent d'une région du monde où le handicap demeure un sujet tabou, le risque de sous-déclaration est élevé lors de la collecte des informations relatives au handicap. C'est pourquoi les résultats présentés dans cette thèse peuvent être biaisés. Par ailleurs, les mesures du handicap utilisées dans cette thèse ne permettent pas nécessairement de distinguer un handicap temporaire d'un handicap permanent. L'enquête ougandaise est une exception le questionnaire permet d'identifier l'année de la survenue du handicap. Malgré les limites présentées par la méthodologie ainsi que les indicateurs du handicap, nous les utilisons dans notre thèse parce que d'une part nous n'avons pas accès à une meilleure méthodologie, et

d’autre part les bases de données disponibles ne contiennent pas de meilleures mesures telles que l’évaluation du handicap par le personnel médical.

Une autre limite de notre analyse est que nous ne tenons pas compte de l'hétérogénéité entre les personnes handicapées, en raison des limites de nos bases de données. Autrement dit, nous considérons les handicapés comme un groupe homogène, et ne faisons pas de différenciation selon la sévérité ou le type de handicap. Une telle différenciation pourrait pourtant fournir des informations plus précises et plus ciblée quant aux mesures à adopter par les pouvoirs publics pour alléger le fardeau que représente le handicap pour les ménages et la société dans son ensemble.

La recherche sur les conséquences socio-économiques du handicap dans le contexte des pays en développement a besoin d’être approfondie et étoffée. Toutefois, un tel objectif ne pourra être atteint tant que les questions sur le handicap sont exclues des enquêtes telles qu’elles se présentent actuellement. Les pouvoirs publics sont donc invités à prendre les mesures nécessaires pour inverser cette tendance et donner plus de visibilité aux personnes handicapées.

CONCLUSION

Cette thèse a pour objectif d'analyser les conséquences socio-économiques du handicap dans le contexte des pays en développement. Cet objectif général se subdivise en trois objectifs spécifiques qui font l'objet des trois articles qui constituent cette thèse. Le premier article évalue l'impact du handicap des parents sur le travail et le capital humain des enfants en Éthiopie. Le deuxième article analyse l'effet du handicap sur l'offre de main-d'œuvre en Ouganda tandis que le dernier porte sur l'évolution à long terme du revenu et des dépenses des ménages suite à la survenue du handicap en Indonésie. Nous avons recours à un modèle à effets fixes pour l'analyse de nos données. Il convient toutefois de souligner que la mesure du handicap utilisée dans les trois articles a ses limites. Elle ne permet pas toujours de distinguer l'individu qui souffre d'un handicap temporaire de celui qui souffre d'un handicap permanent, d'où la recommandation qui suit. A défaut d'évaluer le handicap des individus par le personnel médical lors des enquêtes, il est important d'améliorer la section du questionnaire qui est relative au handicap. Par exemple, on pourrait introduire une question qui permet de savoir si la limitation fonctionnelle est permanente ou non.

Concernant notre premier article, les résultats révèlent que l'impact du handicap des parents sur la vie des enfants varie en fonction du sexe du parent affecté. Tandis que le handicap du père compromet l'accumulation du capital humain de l'enfant, celui de la mère favorise la participation de sa progéniture aux activités économiques. Une désagrégation de notre échantillon selon le sexe de l'enfant, révèle que l'accumulation du capital humain est beaucoup plus sacrifiée chez les filles que chez les garçons lorsque le père est handicapé. Par ailleurs, nous constatons que la pauvreté est le canal à travers lequel le handicap du père affecte l'éducation des enfants.

Ces résultats montrent qu'une attention particulière devrait être accordée aux politiques axées sur la situation des enfants de parents handicapés en Éthiopie. Des études plus poussées sont nécessaires pour savoir si des mesures telles que l'autonomisation des femmes, par exemple, peuvent favoriser l'accumulation de capital humain pour les enfants en général et les filles en particulier quand le père est handicapé.

L'analyse empirique menée dans notre deuxième article nous conduit à conclure que le handicap ne semble pas avoir un effet sur la probabilité de travailler. Cependant, lorsque nous considérons la marge intensive de l'offre de travail, nous constatons que seules les heures de travail des hommes diminuent du fait du handicap.

Une recommandation découle de l'analyse des données ougandaises : la tendance à exclure la section consacrée au handicap des enquêtes existantes, au fil du temps, devrait cesser car elle contribue au renforcement de l'invisibilité des handicapés.

Pour ce qui est du dernier article, les résultats de nos estimations montrent que les ménages affectés par le handicap font face à une augmentation des dépenses de santé ainsi qu'à une baisse du revenu du travail. Par ailleurs, ces ménages sont contraints de se séparer d'une partie de leurs biens et de diminuer leurs dépenses non médicales. Des analyses plus poussées révèlent qu'aucune des composantes de ce dernier agrégat n'échappe aux répercussions néfastes du handicap. En d'autres termes, chacun des postes suivants connait une diminution: les dépenses alimentaires, les dépenses d'éducation et les autres dépenses non-alimentaires. Il est important de mentionner que les dépenses d'éducation connaissent la diminution la plus importante; ce qui représente une menace pour l'accumulation du capital humain des enfants.

Ces résultats suggèrent que les stratégies d'adaptation adoptées par le ménage pour maintenir sa consommation à court terme sont néfastes et compromettent la consommation à long terme. Par ailleurs, nous constatons que le montant des transferts reçus par le

ménage est une fonction croissante de la sévérité du handicap. Il est de ce fait important que les pouvoirs publics tiennent compte des dépenses additionnelles que font les ménages affectés par le handicap lors de la détermination du montant des allocations sociales. Il faudrait toutefois que l'efficience d'une telle mesure soit évaluée.

Notre travail de recherche présente certaines limites. Premièrement, compte tenu de la faible taille de notre échantillon, notre analyse ne tient pas compte de l'hétérogénéité au sein de la population handicapée. En effet, dans nos régressions, les handicapés forment un groupe homogène quel que soit le type ou la sévérité du handicap.

Deuxièmement, face à la difficulté à trouver des instruments valides, nous utilisons un modèle à effets fixes qui n'est pas exempt de critiques: il contrôle les effets fixes individuels ainsi que les effets temporels, mais ignore l'endogénéité liée aux caractéristiques non observables qui changent selon l'individu et au fil du temps. De plus, il ne permet pas l'estimation d'un paramètre si le régresseur qui lui est associé est constant au cours du temps. C'est pourquoi, nous avons des suggestions pour les recherches futures. Premièrement, il est souhaitable qu'elles aillent au-delà de ces limites en utilisant des méthodologies [95] aptes à produire des résultats entièrement débarrassés du problème d'endogénéité. Deuxièmement, elles devraient tenir compte de l'hétérogénéité (type, sévérité du handicap) qui règne dans la population handicapée.

[95] Par exemple, réaliser une expérience randomisée consistant à guérir des personnes handicapées (ex : intervention chirurgicale chez des personnes aveugles suite à une cataracte) et en évaluer les conséquences socio-économiques.